

FINAL REPORT - FROG REPRODUCTION AND DEVELOPMENT STUDY

2000 *RANA PIPIENS* REPRODUCTION AND DEVELOPMENT STUDY



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PREFACE

The following report has been prepared for the “Supplemental Investigation Work Plan for the Lower Housatonic River” under the Technical Support Services, General Electric (GE) Housatonic Project, Pittsfield, Massachusetts, and is intended only for this specific project. The methods used are available in public scientific literature, and are thus, non-proprietary. Potential risk associated with the use or misuse of the methods or results from this study, outside the scope of this project, will be assumed by future investigators. The author would like to acknowledge Mr. Robert Rogers for his assistance in preparing this report.

INTRODUCTION

The United States Environmental Protection Agency (USEPA) is currently characterizing the natural resources of the Housatonic River in portions of Pittsfield, Lenox, and Lee, Massachusetts. The study area is approximately 19 K long and extends from Newell Street in Pittsfield to Woods Pond Dam in Lee. It includes riverine habitats, floodplain wetlands, and uplands associated with the main-stem of the river. Polychlorinated biphenyls (PCBs) that originated from the General Electric (GE) facility in Pittsfield have been found within the river and its adjacent floodplains (Woodlot Alternatives, 2001). Other contaminants of potential concern (COPCs) including dioxins/furans, polynuclear aromatic hydrocarbons (PAHs), Appendix IX organochlorine pesticides, and heavy metals have also been found at various locations within the Housatonic River study area.

Frogs were selected as the representative amphibian species due to their presence in the Housatonic River study area, reported sensitivity to PCBs and the other COPCs identified in the preceding paragraph, high potential for exposure due to both aquatic and terrestrial life stages, and capacity to be evaluated for reproductive and developmental metrics in the field and laboratory. In this report, we describe a study designed to evaluate reproductive performance and potential developmental effects in frogs potentially exposed to PCBs and other identified COPCs. COPCs, including dioxins and furans, are considered to be PCB-like in the sense that they induce similar toxicological effects as PCBs. Because frogs are considered sentinel species in the environment, selection of frogs for this study was further warranted.

The overall objective of this study was to assess the impact of potential PCB and other COPC exposure on local frog populations in the Lower Housatonic River area between the confluence of the East and West branches and Woods Pond Dam (target area). More specifically, the objectives of this study focused on the potential effect of PCB and other COPC contamination on reproduction, early development, and maturation (metamorphosis) in Northern Leopard frogs (*Rana pipiens*). These events represented critical stages in the life cycle of an amphibian and have provided important information concerning the capacity of PCB and other COPCs to

disrupt the life cycle of this anuran species. The *R. pipiens* reproduction and development study was conducted concurrently with a separate developmental study in *R. sylvatica*. The *R. sylvatica* developmental study was conducted to provide assurance that adequate developmental data in amphibians was collected in the event insufficient developmental data was available from the *R. pipiens* reproduction and development study. Results of the *R. sylvatica* developmental study are provided in a separate report (Fort Environmental Laboratories, 2003).

In the present study, effects of PCB and other COPCs exposure to sexually mature adult frogs on reproductive capacity and developmental fitness in their progeny were evaluated using adult specimens collected from both target and reference sites. The routes of exposure and transgenerational transport of the PCBs and other COPCs were also assessed to determine the extent of maternal transfer to the oocytes and developing progeny, as well as, the extent of bioaccumulation during various stages of development. Reproductive performance and early developmental effects were assessed by comparing gravidity, numbers of eggs produced, necrosis, oocyte maturity (stage), sperm count, sperm morphology and viability, fertilization, early embryogenesis, mortality, and morphological development (teratogenesis) in frogs obtained from the target area, with the same endpoints evaluated in frogs originating from an external reference source. To document potential impact on longer-term developmental processes, exposure studies were conducted in the laboratory throughout metamorphosis. Metamorphosis, because of the array of morphological and biochemical processes occurring simultaneously, is a sensitive stage in the life cycle of amphibians and a stage that is sensitive to endocrine disruption. Since several classes of organic contaminants have been shown to alter thyroid function in metamorphosing frogs (Fort et al., 1999a and 1999b), this portion of the study was of great importance.

MATERIALS AND METHODS

PROJECT PARTICIPANTS

The laboratories that participated in this study were Woodlot Alternatives (Topsham, ME), Weston Solutions (Pittsfield, MA), The Stover Group (Stillwater, OK), the Texas A&M University Geotechnical and Environmental Research Group (GERG) (College Station, TX), Fort Environmental Laboratories (Stillwater, OK), and EVS Environment Consultants (North Vancouver, BC, Canada).

Woodlot Alternatives was responsible for the initial ecological characterization (Woodlot Alternatives, 2001), designation of sampling sites, and collection of biological specimens from the field. Weston Solutions collected water and sediment samples, provided a clearinghouse for submission of samples for analytical chemistry analysis to the contract laboratories, and maintained analytical and biological databases. GERG was responsible for conducting COPC analyses with water, sediment, and tissue samples. Culturing and monitoring of developing embryos, larvae, and metamorphs were performed by The Stover Group. Fort Environmental Laboratories completed data collection and review, including an external assessment of malformation and necropsy, data processing, data analysis, and reporting. EVS Environment Consultants assisted with statistical analysis and review of the draft report.

MATERIALS

Equipment used during the field collection phase included the following items: ambient air thermometers, collection nets, drift fence, and funnel traps, digital GPS locators, sphagnum moss (cured and sanitized); data forms; medium seines; fiberboard boxes; field maps; field notebooks and clipboards; field marking pencils; flashlights; bubble wrap; distilled water; live crickets; plastic sheeting; heavy work gloves; steel-toed boots; polyethylene Ziploc-type bags for shipping; portable cassette tape recorders and tapes; cellular 900 MHz telephones; preprinted sample labels; reusable ice packs; liquid nitrogen; dry ice; duct tape; sample containers for

residual egg masses; sample bags for sacrificed female frogs; permanent magic markers; Site Health and Safety Plan (HASP); 6 gallon Styrofoam coolers; Vermiculite; and 3% (w/v) 3-aminobenzoic acid ethyl ester (MS-222) [anesthetic].

APPROACH

Overview

In summary, male and female frogs were collected between March 25 and April 22, 2000, from the target areas and transported to The Stover Group. Because no *R. pipiens* were found, and thus, collected from the originally designated reference sites within the Washington Mountain Lake region due primarily to adverse weather conditions and seasonal factors, *R. pipiens* reference specimens were obtained from Carolina Biological Supply (Burlington, NC), and transported to The Stover Group. In the original study design, the gravidity of the female specimens was determined and recorded; and the gravid females were hormonally super-ovulated to induce production of egg masses, which were then artificially fertilized using sperm collected from males from the same sampling sites. The number of eggs produced per female, frequency of necrosis, and stage distribution were determined. Sperm counts, sperm cell morphology, and overall sperm cell viability were also assessed. However, the poor reproductive condition of the native female specimens collected from the sampling locations within the primary study area resulted in unsuccessful artificial fertilization in the target specimens. Successful artificial fertilization was completed with external reference specimens. The inability to artificially produce viable offspring from the target site specimens necessitated alteration of the study design in order to collect developmental data in *R. pipiens*. In the modified design, field-collected egg masses or young larvae and artificially fertilized external reference egg masses were raised in the laboratory through metamorphosis in respective site water and sediment. Thus, the egg mass and larval specimens cultured from the contaminated sites were not biologically related to the adult specimens collected from the various target sites. Limited egg mass or larval specimens from contaminated sites were found during the re-sampling effort.

Artificially fertilized egg masses from external reference specimens were monitored in the laboratory for fertilization, morphology, and coloration. Mortality and morphological abnormalities were measured in the developing larvae from the external reference egg masses and field collected egg masses and young larvae. Deformities, particularly those that could directly affect juvenile survival, were specifically documented by type of terata induced and number responding. Exposure studies were conducted throughout metamorphosis. An evaluation of metamorphosis, which included limb development, morphology of tail resorption, and development of secondary morphological characteristics, was also conducted. In an effort to establish the role of transgenerational COPC transfer relative to environmental COPC exposure in inducing the toxicological effects observed in this study, a cross over exposure study in which reference hatchlings were exposed to contaminated water and sediment from the study area. Further, to confirm that PCBs were capable of inducing toxicological effects in *R. pipiens*, reference hatchlings were exposed to reference water and sediment spiked with 30 mg/Kg Aroclor 1260. Water and sediment samples, adult whole bodies, ovaries of females from which egg masses were evaluated, and whole bodies of developing larvae were collected for tissue residue analysis to allow determination of a relationship between observed effects and the COPCs [PCBs, dioxins/furans, PAHs, and Appendix IX pesticides and metals]. The utility of measuring multiple parameters (endpoints) decreased the likelihood of overlooking a potential effect from COPC exposure, particularly PCBs.

Endpoints and Data Quality Assurance

Gravidity

Reproductive capacity in female frogs was evaluated initially by determining if mature eggs were present within the specimens collected, and the degree of ovary distension. Although gravidity was a binary response, gravidity was determined immediately upon specimen arrival at the laboratory and was recorded with accompanying chain-of-custody information (sample identification) and health characteristics upon arrival (general appearance and weight). Gravidity was also used to confirm the sex of the specimens.

Eggs Produced (Egg Mass)

Total egg counts were determined and recorded for each specimen. Manual counting of the egg masses was required. Egg masses were counted at least twice, unless the values exceed 10% of one another. In the case of excessive variability, the process of counting was repeated. In addition, a separate analyst using the same criteria described above verified the counts.

Necrosis and Oocyte Stage Profile

The number of necrotic eggs was determined using the same approach and quality assurance measures as described for egg mass determination. The oocyte stage of development profile was one of the best indicators of reproductive status in frogs. The laborious nature of this process required significant attention to consistency to be accurate and required independent peer verification. Data verification using the approach described above for egg mass counting was used to verify the results.

Sperm Count, Viability, and Morphology

The assessment of male reproductive fitness on a gametogenesis level depended on the accurate collection and recording of the data. Total sperm cells and abnormal sperm was counted at least three times unless the values exceeded 10% of one another. In the case of excessive variability, the process of counting was repeated. In addition, a separate analyst verified the counts, using the same criteria described above.

Fertilization

Formation of a cleavage plane in the egg was the unambiguous sign of fertilization and was used to determine the number of eggs fertilized. The same quality control measures described for the previous metrics was used to ensure the quality of the data collected and reported.

Early Embryogenesis, Hatching Success, Mortality, and Morphological Development

To determine the effect of PCB and other COPC exposure on frog development, early embryonic development, hatching, and more advanced morphological development was monitored. Embryolethal effects were also recorded throughout development. A separate analyst using the criteria described above verified counts.

Metamorphosis

The effect of PCB and other COPC exposure on maturation of larval *R. pipiens* was monitored, since this life phase is often a sensitive indicator of potential stress. Detailed records of developmental stage, types and incidences of mal-development, and the normalcy of limb development and tail resorption were collected. Digital photographic documentation of metamorphic events represented an important record of maturation. Peer review by a separate analyst was used to verify the data collected and authenticate the results.

Water and Sediment COPC Analyses

Analysis of water and sediment for the various COPC identified were performed. Quality control specifications for these data are identified in the project-wide QAPP (Weston, 1999).

Tissue Residue Analysis

Analysis of selected tissue samples including, whole adult females, ovaries, and larvae, for the various COPCs identified in this study were performed. QC considerations to ensure achievement of the DQOs for this parameter followed the QAPP (Weston, 1999).

Selection of Test Species

The species selected for this study was *R. pipiens*. *R. pipiens* were present in the Housatonic River study area and constituted an important component of the Housatonic River ecosystem. *R.*

pipiens have a limited home range, spending a good proportion of their life spans in aquatic environments; thus, their COPC body burdens reflected the diet, sediment, and water column concentration in the areas from which they were collected. Also, because *R. pipiens* lay thousands of eggs, it was possible to collect a sufficient number of eggs to ensure completion of the study. Finally, there is an established peer-reviewed methodology for *in vitro* fertilization of *R. pipiens* and culturing of their embryos in the laboratory (Dickerson, 1969; Nussbaum et al., 1983; Carolina Biological Supply Company, 1993; Fort et al., 1996a; Ankley et al., 1998; ASTM, 1998; Bantle et al., 1998).

Sampling Design

Temporal applicability of the study was directed toward the peak breeding season for *R. pipiens* (Stebbins, 1995). The spatial applicability of the study was limited to the reach of the Housatonic River between the confluence and the Woods Pond Dam. This reach represented a range of PCB concentrations in sediment such that development of exposure-response relationships was feasible. Additionally, *R. pipiens* habitat was present in Woods Pond, and other backwater regions.

Adult *R. pipiens* were collected from the target areas over sets of three-day periods between March 25 and April 22, 2000. The search for specimens focused on areas known to be favored by *R. pipiens*, such as shallow areas on the edges of relatively deep standing waters that were sheltered by overhanging trees and brush. Optimal times to search for gravid females were evenings, in light rain. Because gravid females tended to go to areas beyond their typical daily habitat to lay eggs, roadsides and open areas, adjoining favored aquatic habitats were also searched. A key element in the search for females was to listen for the calls of male *R. pipiens*, which tended to reside in the shallow regions of their aquatic environment. While females typically preferred deeper waters, they came to the shoreline in response to male vocalization during the breeding season.

The order in which the sampling locations in the target areas were sampled was flexible, yet systematic, with the objective of collecting frogs from all sampling locations. The goal in

collecting frogs from multiple sampling blocks was to ensure that target frogs represented a range of exposures, thus supporting evaluation of COPC exposure response relationships. The reference and target site sampling locations selected are illustrated in Figures 1 and 2, respectively. Sampling locations ranged in sediment total PCB concentrations from 0.2 mg/Kg to 160.0 mg/Kg. Specimens were collected from nine different target sampling sites. Since no specimens were found, and thus, collected at each of the three originally designated reference sites, specimens were obtained from Carolina Biological Supply (Burlington, NC). These laboratory-cultured specimens were obtained in three separate sets designated as R1, R2, and R3. Due to the time required to process the specimens, including artificial fertilization, staggered shipment of the reference specimens was required to minimize holding times prior to processing. Collectively these specimens are referred to as external reference specimen in the remainder of this report.

All frogs were collected within as short a time frame as possible in order to reduce stress to the frogs that were caught early in the collection phase, and to minimize the possibility of premature release of eggs while in captivity. While females could be held in captivity for a period of up to several months, it was not advisable to extend this time frame. Since shipment of specimens to the lab was staggered, the sampling team continued with field collection efforts (as necessary) while the laboratory proceeded with evaluation of reproductive parameters and artificial fertilization.

Ideally, at least six female and six male frogs were collected from each sampling location, as practicable. The initial three internal reference sampling locations contained sediment PCB concentrations of 0.4 mg/Kg. Although no specimens were collected from these sites, sediment and water samples were collected for the culturing of the external reference specimens. Adult male and female *R. pipiens* were collected from each of nine target site sampling locations. Of the frogs collected per site, at least four frogs were used for the reproduction and development study, with the remaining specimens used for whole-body tissue residue (PCBs and other COPCs) analysis. In several cases, this approach provided a means of relating a reproductive response within the sampling location to a specific concentration of PCBs or other COPCs (Steel and Torrie, 1980; Hicks, 1982; Thompson, 1992). This design also allowed statistical

comparison between the reference and target sites. Additional specimens were collected, when possible, to allow for the following contingencies, all females collected were not gravid, injury or death of frogs during transport. Considering the required change in the experimental design that resulted from the unsuccessful artificial fertilization of the target site specimens as the result of poor reproductive condition, the adult whole body tissue residue concentrations could not be considered biologically-related to the various developmental endpoints evaluated throughout the study. However, it should be noted that the inability to relate adult body burdens to developmental endpoints was not an imperfection in the study design, but rather a manifestation of the poor reproductive condition of the target site native specimens. Further, the reproductive dysfunction observed in the native adults was a more substantial finding toxicologically and weighs appreciably more than the fact that several of the originally intended comparisons between adult body burdens and specific developmental endpoints could not be performed.

METHODS

Field Procedures

Methods of Frog Collection and Temporary Housing

The sampling team captured frogs using several techniques, including drift fences with pitfall traps. The frogs were delivered to the processing area (Weston Solutions Laboratory, Pittsfield, MA) in separate containers labeled with location, sex, and date of collection. Each frog was then placed into its own compartment in a 6 gal. Styrofoam cooler, lined with moist sphagnum moss, for shipment to the laboratory. Perforated lids were securely affixed to the coolers with duct tape to prevent escape and the coolers were labeled.

Prior to delivery to the laboratory, coolers containing 6 frogs each were maintained in air-conditioned rooms with temperatures ranging from 10 to 15°C (Weston Solutions Laboratory, Pittsfield, MA). Frogs were fed a daily diet of live crickets and water. The water used for maintaining the frogs during holding and transportation was collected from the locations in

which the frogs were collected. Additionally, the sphagnum moss was changed, as needed, and kept moist. Representatives of the laboratory (The Stover Group) were available at all times during the collection to assist in making decisions on sampling, if additional sampling locations were needed or the number of frogs requested could not be achieved for any reason. The external reference *R. pipiens* were collected in Vermont and shipped to Carolina Biological Supply (Burlington, NC). The frogs were housed in a temperature-controlled room (10-15°C) with an automatic watering system for a short period, prior to being shipped overnight to The Stover Group laboratory.

Collection of Sediment and Water Samples

Sediment and water column samples were collected at each of the sampling locations within both reference and target sites. Four grab samples of sediment were collected by field staff, in accordance with the methods specified in the Field Sampling Plan (Weston, 1998), at each location. The four grab samples were then composited into a one-gallon sample for each of the sampling locations within the study areas. A similar approach was used to collect water column samples, in which grab samples were composited and then split into 10 one-gallon samples for each sampling location. The water and sediment samples were used to culture the specimens during the developmental phase of the study. Duplicate samples were collected for analytical analysis, as necessary.

Sample Documentation and Labeling

Field notes were recorded in a logbook, in accordance with the field sampling plan (Weston, 1998). Each frog was identified in the logbook using a unique 16 digit sample identification number assigned by Weston Solutions (Pittsfield, MA). Sample nomenclature methodology was specifically described in the QAPP (Weston, 1999). The label coding system was not explained to biological laboratory personnel to ensure that they remained blind as to the origin of a given specimen. Global positioning system (GPS) data was collected so that the geographical coordinates of the collection locations were identified. Specific documentation of habitat within each location was provided using digitally collected images and written field observations. In

addition, analytical samples were recorded in a logbook using labeling consistent with that specified in the QAPP (Weston, 1999).

Sample Preservation and Shipping

Live female and male frogs were transported to The Stover Group via overnight commercial courier service in Styrofoam coolers lined with moist sphagnum moss and an excess of live crickets. The coolers were labeled and sealed with perforated sides and lids. Two signed and dated custody seals were placed on two sides of the cooler to ensure the specimens were not tampered with during shipment. Following artificial fertilization, all females that had been gravid were euthanized, frozen, and packaged for possible shipment to the analytical chemistry laboratory for tissue residue analyses. Males used in the artificial fertilization process were also euthanized following removal of the testes, frozen, and packaged for potential shipment to the analytical chemistry laboratory. Additionally, residual portions of the egg masses and testes were frozen and packaged with each respective carcass for possible tissue analysis.

Adult specimen, ovary samples, and water and sediment samples were shipped to the Weston Solutions (Pittsfield, MA) for submittal to the analytical laboratory (GERG) in dry, clean, perforated sample containers that were labeled in accordance with ERT/REAC SOP #2002 (EPA, 1994). The Styrofoam ice chests were placed into polyethylene bags (one sample per bag), which were then sealed and placed into U.S. Department of Transportation (DOT) approved fiberboard boxes lined with plastic sheeting, bubble wrap, and sufficient vermiculite to absorb any potentially leaking material. All outer packing materials were also perforated to allow gas exchange. One chain-of-custody form (in triplicate) was placed into a watertight bag and taped to the inside of the lid of each cooler. Specimens to be analyzed for analytical parameters, including PCBs, were packaged as described above following snap freezing in liquid nitrogen and inclusion of dry ice. In accordance with DOT regulations, the lids were slightly perforated to allow for release of carbon dioxide gas as the dry ice melted. In this case, the Styrofoam coolers were then placed into cardboard boxes that had also been perforated to allow gas release. The boxes were securely taped and appropriately labeled, according to the courier's protocols. International Civil Aviation Organization regulations stipulated that any volume of

dry ice was a Class 9 Miscellaneous Hazardous Good (IATA, 1993). In order to provide a means by which the entire path of a sample could be traced, a chain-of-custody record was maintained from the time a sample was collected through analysis, as specified in the QAPP (Weston, 1999).

Laboratory Procedures

A synopsis of the sampling locations, and sediment and water samples used in the culture of specimens collected during the present study is provided in Appendix A. The laboratory procedures are described in the following sections.

Artificial Fertilization

After allowing female frogs to acclimate for at least 24-h following receipt by The Stover Group, female frogs were induced to ovulate and the egg masses were stripped and fertilized, if possible *in vitro*. It was only upon stripping the eggs that a definitive determination of gravidity was made. The number and identity of gravid versus non-gravid females was recorded for a subsequent analysis. In addition, the number of eggs produced by each female was specifically counted in representative ovary sections.

Super-ovulation was induced by injection of the equivalent of approximately 100 IU of luteinizing hormone releasing hormone (LHRH) in the form of leopard frog pituitary extract (Carolina Biological Supply, Burlington, NC) in 1 mL of spring water using a tuberculin syringe with ½-inch-long 26 gauge needles, in accordance with methods cited in Parris (1999), Parris et al. (1999), Parris et al. (2001), Porter and Licht (1985), Bantle et al. (1998), Fort and Stover (1995 and 1996a), and ASTM (1998). The females were carefully immobilized prior to injection by holding them underneath an aquarium net. One mL of the reconstituted pituitary extract was injected into the dorsal lymph sac, which was bound by the lateral line that runs along the side of the frog and appeared as stitching on the skin. Care was taken to inject the frog sub-cutaneously by wrinkling the skin.

The testes from male frogs from each location were removed and the specimens were sacrificed. Testes from each male were gently mashed together in a Petri dish containing 9 mL of spring water. A 1 mL aliquot of the resultant sperm solution was checked for sperm count, motility, and dysmorphology under a microscope (Fort et al., 1999). Approximately 24-36 hours after the females were injected with pituitary extract, egg masses were gently squeezed out of the females into the concentrated sperm solution by firmly grasping the frog, extending the legs back and close to each other, and applying gentle pressure on the abdomen.

Sperm solutions prepared from the testes of these males were used to fertilize eggs from each respective female from a given sample site. Egg masses were squeezed out of the females into the concentrated sperm solution by firmly grasping the frog, extending the legs back and close to each other, and applying gentle pressure on the abdomen. After standing in the sperm solution for 30-45 minutes, the eggs were flushed with culture water and were loosely separated to minimize crowding. After 2-h the eggs were checked for fertility and quality. Grey crescents that form on the opposite side of sperm entry, immediately above the equator, dividing the animal pole from the vegetal pole, was the first sign of fertilization. Normal cleavage (indicating successful fertilization) was determined based upon the general technique of Nieuwkoop and Faber (1994) and Dickerson (1969). Since cellular development can be observed, early embryogenesis was also monitored. Egg masses characterized by significant infertility were recorded relative to the origin of the female, so that differences in fertility rates would subsequently be evaluated.

Early Developmental Monitoring and Evaluation of Metamorphosis: Field Collected Egg Masses and Larvae

The origins of specimens used for the developmental studies included artificially fertilized egg masses from the external reference specimens, egg masses from sites W-7a, W-4, and W-1 (18.0, 0.5, and 0.2 mg/Kg total PCBs, respectively), and newly hatched larvae from sites W-6 and EW-3 (42.0 and 30.0 mg/Kg PCBs, respectively). No developmental studies were conducted on target sites E-5, W-9a, W-8, and E-1; no specimens were found at sites E-5 and W-9a (37.0 and 4.3 mg/Kg total PCBs, respectively), only 1 larvae was found at site W-8 (120.0 mg/Kg total

PCBs), and only salamander egg masses were found at site E-1 (160.0 mg/Kg total PCBs). Regardless of the type of *R. pipiens* specimens collected or their origin, larval specimens were placed intact into test vessels for culture in accordance with the following design scenario for each site.

- Site W-7a (18.0 mg/Kg total PCBs) – One field-collected egg mass with newly post-hatch larvae placed into 4 separate culture chambers (n=30, 25, 25, and 25). Replicates not independent;
- Site W-6 (42.0 mg/Kg total PCBs) – Field-collected newly post-hatch larvae placed into 4 separate culture chambers (n=25, 25, 25, and 23). Replicates not independent;
- Site W-4 (0.5 mg/Kg total PCBs) – Two field-collected egg masses with newly post-hatch larvae placed into 4 separate culture chambers (n=30, 25, 25, and 25) for each egg mass. Two independent replicate sets;
- Site EW-3 (30.0 mg/Kg total PCBs) – Field-collected newly post-hatch larvae placed into 1 culture chamber (n=10);
- Site W-1 (0.2 mg/Kg total PCBs) – One field-collected egg mass with newly post-hatch larvae placed into 4 separate culture chambers (n=30, 25, 25, and 25). Replicates not independent; and
- R3 external reference specimens – Two separate artificially fertilized egg masses with newly post-hatch larvae placed into 4 separate culture chambers (n=20, 20, 20, and 20) for each egg mass, (2 independent replicate sets).

In this study, the age difference between the field-collected egg masses, field-collected larval specimens, and external reference larvae was considered insignificant with respect to the overall interpretation of the effects data. In the case of the field-collected egg masses or larvae, the specimens were approximately the same age (\pm 2-3 d) and were subjected to comparable exposure conditions in the field prior to collection.

Since the primary source of contaminant to the developing embryos could not be assumed to be maternal transfer during oogenesis and egg maturation, it was necessary to add target site or

reference site water and sediments to the test vessels. Fertilized egg masses were transferred to 4 replicate, 4 L exposure chambers (20 per replicate vessel) for monitoring throughout metamorphosis. Teflon® mesh inserts were inserted into the exposure vessel at the sediment/water interface prior to the addition of the larvae. Approximately 200 g of sediment (wet weight) was placed in the bottom of each 4 L container, the exposure inserts added, and the vessels filled with 3 L of site water. This represented a 1:15 dilution of sediment to dilution water. Although this ratio of sediment to water was less than that typically used in similar studies (Fort and Stover, 1997b), the high amount of decaying organic material in the sediment samples made it physically impossible to achieve a greater ratio of sediment to water. Test chambers containing embryos from reference and target areas were discretely labeled and then randomly distributed on shelves in a temperature controlled room. Laboratory test vessels were labeled with the appropriate sample numbers. Laboratory personnel were blind to the origin of each sample with respect to contamination levels. A pH range of 7.0-8.5 and a temperature of $23 \pm 1^\circ \text{C}$ was maintained in the cultures. Although each culture vessel was aerated, dissolved oxygen was monitored and was not allowed to drop below 6.0 mg/L. The test chambers were maintained on a 12-h day/12-h night cycle. Renewal of test solutions and sediments during this longer-term development phase will be performed every seven days (weekly). Dead embryos were removed, counted, and recorded daily. During the culture phase, digital images of the developing larvae were recorded during the renewal process both for observation of the developing limbs and resorbing tail, as well as photographic documentation of the results, in accordance with the methods for Fort and Stover (1996b), Fort and Stover (1997a), and Fort et al. (1999a).

In order to determine the role of transgenerational (maternal) PCB and other COPC transfer on developmental effects induced in target site embryos/larvae, a separate set of experiments was performed concurrently. In these studies, an additional set of at least 120 artificially fertilized embryos from external reference females were exposed to water and sediment from a site containing elevated levels of sediment total PCBs (sample site W-8 [120.0 mg/Kg sediment total PCBs]), and developmental effects (hatching and metamorphosis) monitored as described in this section. Additional embryos from external reference females were also cultured in reference site water and sediment (site MP [0.04 mg/Kg sediment total PCBs]) for comparison to the target

site. The reverse cross over experiment was not conducted due to the lack of fertilized embryos from a highly contaminated site location. However, an Aroclor 1260 reference sediment spiking experiment, in which artificially fertilized embryos from the external reference specimens were cultured in reference site water and sediment (site MP) spiked with 30.0 mg/Kg Aroclor 1260, was performed to help confirm the effects of PCB contaminated sediment on embryo-larval development.

The embryos were expected to hatch within 7-10 days (Gosner, 1960). Developing embryos/larvae were not fed during the seven-day pre-hatch observation period, since the yolk sac that remained following hatching provided sufficient nourishment for the first 7-8 days. Following hatching (longer-term evaluation), larvae were fed Salmon Starter fish food, which had been successfully used to culture *Rana* tadpoles in the laboratory (Carolina Biological Supply Company, 1993). The following specific abnormalities were recorded: gut, hemorrhaging, axial malformations, blistering and edema; and the malformation of the head, face, eye, heart, and brain.

Analytical Analyses

(GERG) was responsible for conducting the following COPC tissue analyses, total PCBs, Aroclor-specific PCBs, dioxins and furans, PAHs, and Appendix IX pesticides and metals. Tissues from a whole body adult composite ($n \geq 2$, typically 3 to 4 individuals, both male and female), individual females (offal sample, ovaries removed), an ovary/egg mass sample from the individual females, and one embryo/larval sample per sampling location were analyzed. In addition, composited water and sediment from each sample site location were analyzed for the parameters indicated above, as well as, general water quality measurements for the composited water samples.

DATA ANALYSIS

Data Collection

For embryo-larval and limb development; mortality, malformation, and growth rates were determined for the test site and external reference specimens, using a dissecting microscope (Fort et al., 1995, 1996b and 1997a; ASTM, 1998). For monitoring the rate and extent of metamorphosis, video images were captured using a Sony CCD-iris high-resolution color digital video camera. A Pentium 233 MHz computer with image processing software and a FlashPoint 128 (Integral Technologies, Inc., Indianapolis, IN) video frame grabber was used to digitize head-to-tail lengths throughout the study. A ruler videotaped with the larvae was used to correct for image distortion and calibrate the length-measuring program to ensure accurate measurements of the larvae. Head-to-tail lengths were measured using Sigma Scan software (SPSS, Corte Madera, CA).

As an initial step in the evaluation, a database was developed for the target and reference areas. This database was developed in spreadsheet/database format and sorted by sample site and endpoint measured at the individual level. For the reproductive endpoints, the database included the following information: identification number of the male and female frogs, gravidity, egg mass, necrosis, portion in respective oocyte stages, number of eggs, sperm counts and sperm morphology, and adult tissue residues. In terms of the developmental endpoints in the field-collected specimens cultured in the laboratory, the database included: field-collected egg mass or larvae sample identification number, mortality incidence, abnormality incidence by type of deformity and total number, limb mal-development, rate of and abnormalities occurring during metamorphosis, and larval tissue residues.

The accuracy of the data entry was evaluated prior to statistical evaluation. In order to streamline the scope of analysis, evaluation of the data sets in this report was based on total PCB, total dioxins and furans, total PAHs, and total Appendix IX pesticides and selected metals.

Statistical Analysis

Hypothesis Testing

Statistical evaluations of differences in outcomes between respective crossover study treatments, or treatments associated within the Aroclor 1260 spiking study, were evaluated based on homoscedastic t-tests (1 tail, 0.05), providing the data sets were found to be normally distributed with homogeneous variance using ToxCalc 5.0 (Tidepool Scientific Software, 1994).

Proportional data was transformed using an arcsine square root transformation prior to formal statistical evaluation. Normality of data set distributions was determined by the Shapiro-Wilks test. For non-normally distributed data sets, non-parametric tests, such as the Wilcoxon Two Sample test (1 tail, 0.05) and Kruskal-Wallis one-way ANOVA ($P=0.05$), were used. To be ecologically conservative, no adjustment to the significance level was performed during this analysis. Conclusions based on the hypothesis test were further examined with respect to biological significance.

Correlation Analysis

Relationships between various biological effects observed and tissue and sediment total PCBs were evaluated using Spearman's Rank Order Correlation matrices (two-tailed test, 0.05). Data from the reference sites, which used external reference *R. pipiens*, were excluded from the concentration-response evaluations. As with the hypothesis tests, data sets were evaluated for normality prior to analysis.

QUALITY ASSURANCE/QUALITY CONTROL

Data Quality Indicators and Assessment

As previously indicated, the primary objective of this study was to assess the impact of PCB and other COPC exposure on frog reproduction and development. Overall, this study attempted to determine the effect of PCB exposure to sexually mature adult *R. pipiens* on reproductive

capacity and developmental fitness in their progeny by comparing a series of biological and toxicological indicators in specimen obtained from an uncontaminated source (external reference specimens) and contaminated areas (target sites). As previously indicated, the present study was unable to meet the stated objective of comparing reproductive fitness in the adults to developmental effects in the progeny. However, this was not the result of a design weakness, but rather the magnitude of biological effects on adult reproduction, eliminating the possibility of direct study links to developmental responses. However, regardless of study outcome, the following data and specific quality assurance criteria were required. Procedures were established to ensure the accurate collection of the following data.

Data Quality Objectives

Data developed in the frog reproduction and development study had to meet acceptable standards of precision, accuracy, completeness, representativeness, comparability and sensitivity, as defined in Section 15 of the QAPP (Weston, 1999). Each of these data quality indicators, some of which were not readily quantifiable for data associated with this study, is discussed below.

Precision was defined as the level of agreement among repeated independent measurements of the same characteristic. Because of the biological heterogeneity inherent in *R. pipiens* communities, it was not possible to take repeated independent measurements of the biological parameters. Precision was also evaluated by the assessment of the degree to which sample collection procedures were able to ensure collection of a consistent number of samples. For measurements that were not unique to the frog reproduction and development study, such as water and sediment chemistry and tissue residues, precision was evaluated as defined in the QAPP (Weston, 1999).

Accuracy was defined as the agreement of a measurement with its true value. For the parameters unique to this study, accuracy was defined as meaning that the test metrics were correctly determined in each sample, correctly enumerated, and correctly recorded. Accuracy of each test metric was a function of each sample being processed, reviewed, and recorded, and of consistent field sampling techniques. The data generated by this study were evaluated for accuracy via

comparison with known and/or expected results from similar studies conducted in the Housatonic River or in similar ecosystems, although a limited number of comparable studies were currently available. For parameters such as water and tissue residue and sediment contaminants, accuracy was as defined in the QAPP (Weston, 1999).

Completeness was defined as the percentage of the planned samples actually collected and processed. Completeness was evaluated for all components of the frog reproduction and development study. To ensure achieving the planned statistical resolution, it was important that completeness, reasonably near 100%, be achieved for all components of this study, with the exception of the tissue residue analyses. The minimum sample size required to complete this study, based on the anticipated test metric variance, was approximately 30 males and 30 females for the study. Thus, approximately 3 male and 3 female frogs needed to be collected per site. For the tissue analysis study component, the material available for collection determined the number of analyses, and establishment of an *a priori* completeness goal was not possible.

Representativeness referred to the degree to which the data accurately reflected the characteristics present at the sampling location, at the time of sampling. This data quality indicator was addressed through implementation of proper sampling design, sample processing methods, and sample analysis, which were evaluated via comparison with known and/or expected results.

Comparability was a measure of the confidence with which the frog reproduction and development data could be compared to another similar data set. Comparability was evaluated for this data set through comparison with known characteristics of *R. pipiens* communities in similar ecosystems in the Northeast (Woodlot Alternatives, 2001).

Sensitivity, the ability of a measurement technique or instrument to operate at a level sufficient to measure the parameter of interest, was difficult to apply to the biological parameters associated with this study. Frog reproduction, development, and maturation represented sensitive indicators of frog health and fecundity. The ability of the test metrics, designed in this study to determine potential changes in reproductive capacity or developmental fitness relative to

corresponding tissue COPC residues or sediment COPC levels, was the primary determinant of the sensitivity of this model system. Sensitivity of analytical analyses alone was described in the QAPP (Weston, 1999).

Data Validation, Verification, and Usability

Procedures for data validation for the chemical and physical data were discussed in various sections of the project QAPP (Weston, 1999) and were used whenever applicable in this study. For the biological data, usability was largely determined by three factors: (1) the experience of the principal investigators in establishing that the field sampling was conducted using appropriate techniques and that accuracy and precision were not compromised by an inability to control the sampling procedures in the field; (2) an evaluation of the toxicological data as compared with previous studies; and (3) a direct comparison between the analytical chemistry and tissue residue data and similar data collected by other studies from similar areas of the river. The purpose of the remainder of this section is to document the measures included in the study to ensure that the standards discussed above were met.

Sample Analysis

Laboratory Studies

Processing of the frogs for artificial fertilization, early developmental monitoring, and evaluation of metamorphosis followed procedures established in the preceding sections. All samples were processed by experienced staff, trained in this area, and whose work their supervisors and peers periodically checked. Methods of QC for each metric evaluated were addressed in the DQOs. Each analysis was repeated until consistent results were obtained (i.e., two separate egg counts within a given specimen should fall within 10% of one another). Verification by a separate analyst was also used to authenticate the results. Corrective action, including reprocessing of samples and retraining of staff, was instituted if these QC checks produced unsatisfactory results.

Physical/Chemical Samples

Samples for water and sediment chemistry and tissue residue analysis were processed following procedures and SOPs provided in the project-wide QAPP (Weston, 1999). These samples were submitted in catalogs and batches with other samples from the larger project, and data validation was performed on a catalog basis in accordance with procedures established and described in the QAPP (Weston, 1999).

Data Analysis and Reporting

Data collection, statistical analysis, and reporting for this study were also described in preceding sections. This final report including all data, analyses, and interpretations, was prepared with specific reference to both the DQOs of the specific protocol for the frog reproduction and development study and section 4.1 of the project-wide QAPP (Weston, 1999).

RESULTS

SAMPLE COLLECTION

As previously mentioned, no adult specimens were found in the three internal reference sites, WML, MP, and TP. Overall, considerable difficulty in locating and collecting specimens from the reference sites, and thus, meeting criteria established in the Materials and Methods section, was encountered during the present study. Thus, the use of external reference specimens (R1, R2, R3, and R4) purchased from Carolina Biological Supply (Burlington, NC), a commercial supplier specializing in aquatic biological field specimens for laboratories, was warranted to meet the established criteria. As indicated in the Materials and Methods Section, the term “External Reference Specimens” refers specifically to reference or control specimens collected from a location outside the designated study area. The designations “R1, R2, and R3” represented the first, second, and third sets of external reference adult *R. pipiens* (male and female) and any of their progeny. R1, R2, and R3 specimens were verified by Carolina Biological Supply as adult *R. pipiens* collected in Vermont. The designation “R4” referred to external reference egg masses artificially fertilized at Carolina Biological Supply and shipped overnight to The Stover Group laboratory. The origin and species of the female frogs producing the egg masses were confirmed by Carolina Biological Supply as being *R. pipiens* collected in southern Canada. It should be noted that only the reference specimens were obtained from an outside source. All water and sediment samples designated as reference site and used for the culture of artificially fertilized external reference specimens were collected from reference site MP. External reference specimens cultured in reference site MP sediment and water were used as a means of providing baseline data from a healthy population and were not used in evaluating any correlation analysis.

In summary, 18 female and 18 male *R. pipiens* (external reference specimens) were received from Carolina Biological Supply (Burlington, NC). Fifty-seven adult female and 51 adult male *R. pipiens* were collected from the target region. At least 6 specimens of each sex were found at each of the target sampling locations, with the following exceptions. Only 2 female specimens

and no male specimen were found at site E-5. In addition, 5 female and 5 male specimens were found at site W-4. Five male specimens were also collected at site W-7a. Chain-of-custody documentation, complete chemical analyses, reproductive-phase sample inventory lists and data tables, developmental-phase sample inventory list and data tables, and the project photo atlas are provided as Appendices B-F, respectively.

WATER QUALITY CHARACTERISTICS

Results of water quality characterization of samples collected from the pools during field collection and samples collected for the culturing portion of the developmental studies are reported in Table 1. Generally, aquatic habitats suitable for amphibians are of low to moderate hardness with near neutral to slightly alkaline pH, and adequate levels of dissolved oxygen (>4.0 mg/L). Little is currently known about trace mineral requirements, although the presence of calcium, magnesium, and potassium appear to be important. Excessive levels of ammonia and nitrite can be deleterious. However, the water quality characteristics of the various sampling locations were reasonably consistent with normal habitat requirements for *R. pipiens*.

WATER AND SEDIMENT TOTAL PCB ANALYSIS

Results of water and sediment PCB analysis are provided as Appendix C. A summary of these results is presented in Table 2. It should be noted that the sediment chemistry data presented for the present studies represented discrete values taken from a single sampling site. These data were collected in support of the two amphibian ecotoxicological studies. No sediment data collected prior to the initiation of the two amphibian studies were included in the sediment chemistry values presented in either developmental determinations of contaminants effects on amphibian populations (i.e., spatially weighed vernal pool and backwater habitat data in the evaluation of concentration/response relationships), but use of additional data in the interpretation of relative risk of COPCs is beyond the scope of these reports. All PCB values were reported as dry weight for sediment samples and wet weight for tissue samples. The initial sediment total PCB levels (samples collected on 3/30/2000 for target sites and 5/24/2000 for

reference site MP) ranged from 0.04 mg/Kg at reference site MP to approximately 160.0 mg/Kg at target sampling site E-1. The remaining sampling location total PCB levels were approximately 0.2, 0.5, 4.3, 18.0, 30.0, 37.0, 42.0, and 120.0 mg/Kg at sites W-1, W-4, W-9a, W-7a, EW-3, E-5, W-6, and W-8, respectively.

Although water total PCBs from each of the test and reference sites were not used in the analysis of the present data, water total PCB levels measured at target sites E-5, W-9a, W-8, W-7a, W-6, W-4, EW-3, E-1, and W-1 were 4.3×10^{-5} , 1.3×10^{-5} , 1.4×10^{-4} , 3.0×10^{-5} , 2.2×10^{-4} , 1.3×10^{-5} , 4.1×10^{-4} , 2.4×10^{-4} , and 1.3×10^{-5} mg/L, respectively. The water total PCB concentration at reference site MP was 1.3×10^{-5} mg/L. Sediment and water total PCB results for reference sites WML and TP were not provided. Also, any additional congener analytical results for sediment and water samples were not provided. Water total PCB measurements were not included in data analysis, as the water data are not relevant to the larval developmental endpoints. Water samples were collected during the collection of the adult animals. Additional water samples were not collected during the field-collection of egg masses. Therefore, comparison of larval development to these water data was not biologically relevant.

REPRODUCTIVE EVALUATION AND ARTIFICIAL FERTILIZATION

Adult Tissue Residue Analysis

Tissue residue analyses from the adult female specimens during the present studies are summarized in Table 2. Complete results of tissue analyses are included as Appendix C. As previously indicated, although more extensive chemical analyses were performed, evaluation of the relationship between COPCs and biological effects were based on total PCB, total dioxins and furans, total PAHs, total Appendix IX pesticides and metals; Al, As, Ba, Be, Cd, Cr, Cu, Fe, Pb, Mg, Mn, Hg, Ni, Se, Sr, V, and Zn. Total PCB levels were measured in adult whole bodies composited within each site (labeled as Adult Chemical Analysis Specimens), ovary samples from two adult female specimens from most of the sites, and corresponding offal samples from the preceding two specimens from which ovary samples were collected (both labeled as Adult

Experimental Analysis Specimens). Only one ovary and offal sample was collected from specimens from sites W-6 (42.0 mg/Kg sediment total PCBs). No ovary and offal samples were analyzed from sites E-5, W-8, W-4, and E-1 (37.0, 120.0, 0.5, and 160.0 mg/Kg sediment total PCBs). Three sets of ovary and offal samples were analyzed from R3 external reference specimens. Appendix IX pesticides and metals, dioxins and furans, and PAHs were also measured in the offal samples collected from each site.

A comparative illustration of tissue total PCB levels and the relationship between sediment total PCBs and tissue total PCB concentrations from the various sampling sites is presented in Figure 3 and 4, respectively. Total PCBs in whole body composites ranged from 0.01 to 0.04 mg/Kg in the reference specimen females (R1-R3). Whole body total PCB levels in the target site specimens ranged from 0.15 mg/Kg in site W-1 (0.15 mg/Kg sediment total PCBs) specimens to 5.39 mg/Kg in composited specimens collected from site W-8 (120 mg/Kg sediment total PCBs).

Ovary tissue samples ranged from 0.008 to 0.04 mg/Kg in the external reference specimens to 0.24 mg/Kg in specimens from site W-1 (0.15 mg/Kg sediment total PCBs) to 45.1 mg/Kg in specimens from site W-9a (4.3 mg/Kg sediment total PCBs). Heterogeneity in ovary total PCB concentrations were found in specimens collected from the more highly contaminated sites compared to the lesser-contaminated sites. For example, total PCB levels in ovary samples collected from two different specimens from sites W-9a (4.3 mg/Kg sediment total PCBs) and W-7a (18.0 mg/Kg sediment total PCBs) ranged from 0.57 mg/Kg to 45.1 mg/Kg and 1.63 mg/Kg to 26.8 mg/Kg, respectively. However, little heterogeneity in results was found in ovary tissue collected from specimens from site W-9 (0.24 and 0.29 mg/Kg), which contained lower sediment total PCB levels (0.15 mg/Kg sediment total PCBs).

Overall, offal total PCB levels in the specimens sampled were markedly lower than the corresponding ovary total PCB levels. Offal total PCB levels in the reference specimens sampled ranged from 0.001 to 0.03 mg/Kg. Offal levels in target site specimens ranged from 0.01 mg/Kg measured in specimens from site W-1 (0.15 mg/Kg sediment total PCBs) to 2.56 mg/L found in specimens collected from site W-7a (18.0 mg/Kg sediment total PCBs). As noted

with ovary total PCB levels, offal total PCB concentrations measured in target site specimens varied more than in specimens from the less contaminated sites and the reference specimens.

Appendix IX pesticides and metals, dioxins and furans, and PAHs were also measured in one offal sample from a reference specimen, as well as, specimens from sites W-9a, W-7a, EW-3 (two samples), and W-1 (4.3, 18.0, 30.0, and 0.15 mg/Kg sediment total PCBs). Total Appendix IX pesticide levels in the reference offal samples ranged from 5.6 to 29.3 µg/Kg. Total Appendix IX pesticide levels in target site offal samples ranged from 8.9 to 31.1 µg/Kg. Total dioxin/furan levels in reference offal samples ranged from non-detected (ND) to 127.7 ng/Kg; whereas, offal samples from target site specimens ranged from ND to 21.3 ng/Kg. Total PAH levels in reference offal samples ranged from 37.7 to 127.7 µg/Kg. Total PAH levels in target site offal samples ranged from 27.9 to 62.1 µg/Kg. Cd, Pb, and Hg levels in reference offal specimens ranged from 0.13 to 0.25 mg/Kg, 0.12 to 0.28 mg/Kg, and 0.07 to 0.14 mg/Kg, respectively. Ni was not detected in the reference offal samples. Cd, Pb, Hg, and Ni levels in offal samples collected from target site specimens ranged from 0.17 to 0.43 mg/Kg, 0.29 to 0.97 mg/Kg, 0.20 to 0.31 mg/Kg, and ND to 0.56 mg/Kg, respectively. The levels of Appendix IX metals were relatively low, not appreciably different between target site and reference specimens.

Reproductive Metrics

Specimen inventory lists and data tables collected from the reproductive studies are provided as Appendix D. It should be noted that the adult external reference specimens were not exposed to the same environmental stressors that the adult specimens collected from within the lower Housatonic River watershed were exposed. Therefore, adult external reference specimens were used only as a point of reference, and not for statistical analysis, in the reproductive study.

For this study, females were considered juvenile if their weight was <20 g. Since female leopard frogs typically are reproductively mature during their second year (ca. 20-30 g), this designation was appropriate and consistent with Stebbins and Cohen (1995), Gilbert et al. (1994), and

Merrell (1977). Males become sexually mature earlier and many reproduce during their first year (ca. 10-20 g). Thus, males <10 g were considered juveniles. In the present study, none of the males collected were juveniles and all juvenile females were excluded from analysis.

Whole Body Weight, Ovary Weight, and Testis Weight

Mean female whole body weight of the specimens collected from the target sites and reference specimens is presented in Figure 5. A general trend in reduced female body weight was observed in specimens collected from the target site locations when compared to the external reference specimens. The relationships between sediment total PCBs, whole body (Adult Experimental Specimens) total PCBs, or ovary total PCBs; and female whole body weight (Adult Experimental Specimens) is provided in Table 3.

Mean male whole body weight of the specimens collected from the target sites and reference specimens is presented in Figure 6. Unlike the female specimens collected, a general trend in reduced male whole body weight was not observed in specimens collected from the target site locations when compared to the external reference specimens with the exception of site W-4 (0.5 mg/Kg sediment total PCBs).

Mean female ovary weights of the specimens collected from the target sites and reference specimens are presented in Figure 5. As was found with whole body weights, a general trend in reduced ovary weight was observed in specimens collected from the target site locations when compared to the external reference specimens. Mean ovary weight, expressed as percent of whole body weight, was nearly 30% in reference specimens (R1-R3), whereas, with the exception of site W-7a (8.0 mg/Kg sediment total PCBs) specimens (ca. 22% of total body weight), the mean ovary weight of the remaining target site specimens was $\leq 7\%$ of the total body weight. The relationship between sediment total PCBs, whole body (Adult Experimental Specimens) total PCBs, or ovary total PCBs; and ovary weight (as % total body weight) is provided in Table 3.

The mean testes weight, expressed as % of the body weight, of the specimens collected from the target sites and reference specimens are presented in Figure 6. The mean testes weight in specimens collected from sites W-8, E-1, W-4, and W-7a (120.0, 160.0, 0.5, and 18.0 mg/Kg sediment total PCBs, respectively) were 0.079, 0.102, 0.089, and 0.096% of the mean body weight, respectively. The mean testes weight, expressed as % of the body weight, of the external reference specimens was 0.176% for R1, 0.106% for R2, and 0.142% for R3.

Gravidity

Gravidity was a subjective assessment of reproductive status in the adult female as marked by the presence of mature eggs. Externally, gravidity was determined by assessing the degree of distension of the ovaries, determined by gently squeezing the flanks of the female. Since, this measure of reproductive status was subjective, it was confirmed by a specific examination of the ovaries and oocytes. Only external reference female specimens were found to be gravid by formal definition. For the external reference specimens R1, R2, and R3, 100% of the females evaluated (n=13) were found to be gravid. However, several female frogs collected from sites W-7a, W-6, W-4, EW-3, and W-1 (18.0, 42.0, 0.5, 30.0, and 0.2 mg/Kg sediment total PCBs, respectively) were found to be “slightly gravid”. In this case, a slight distension in the ovaries was noted. Without the specific examination of the ovaries or egg masses, it would have been impossible to determine whether the “slightly gravid” specimens were reproductively fit. None of the female specimens collected from E-5, W-9a, W-8, and E-1 (37.0, 4.3, 120.0, and 160.0 mg/Kg sediment total PCBs, respectively) were found to be gravid.

Oocyte Characteristics

As oocytes mature, they grow in size and weight. Thus, oocytes that were mature and ready for fertilization typically weigh more than immature oocytes. An alternative means of expressing the total number of oocytes, in a given female specimen, was the number of oocytes per g of ovary tissue. Thus, a lower mean total oocyte value normalized to ovary tissue weight, in some cases, reflected a greater level of oocyte maturity in the ovary. Obviously, this assessment required confirmation by specific examination of the oocyte stage distribution. The mean total

number of oocytes present in the external reference females and female specimens from each of the target sites is presented in Figure 7. The relationship between sediment total PCBs, whole body (Adult Experimental Specimens) total PCBs, or ovary total PCBs; and oocyte density is given in Table 3. It should be noted that due to overall immaturity of the oocytes, resulting in the inability to acquire adequate total egg counts for many of the specimens examined, this data set was somewhat more limited than the other reproductive test metric data sets.

The specific stage distribution of oocytes from females collected from the external reference specimens and each of the sampling locations within the target sites is presented in Figure 8. In this assessment, oocytes were staged as being immature ($<$ stage III), of increasing maturity (\geq stage III), or mature and ready for fertilization (stage VI). The reference specimens demonstrated a distribution of oocytes stages, however over 80% were stage III or greater and over 70% were stage VI. These specimens were reproductively fit and capable of producing offspring. Maturing oocytes (\geq stage III) were found in females at target site sampling locations W-7a, W-4, and EW-3 (18.0, 0.5, and 30.0 mg/Kg sediment total PCBs, respectively). It should be noted that a reasonable proportion of maturing oocytes was also found in ovaries from females collected at site W-1 (0.2 mg/Kg sediment total PCBs). Only traces of mature oocytes were identified in females from target site sampling locations W-7a, W-4, EW-3 (18.0, 0.5, and 30.0 mg/Kg sediment total PCBs). The relationship between sediment total PCBs, whole body (adult experimental) total PCBs, or ovary total PCBs; and the proportion of immature ($<$ Stage III) oocytes is presented in Table 3. The greatest proportion of mature oocytes found in target site females was ca. 5% from site W-7a. The proportion of stage VI oocytes in the external reference females ranged from 55% to nearly 90%. The relationship between sediment total PCBs, whole body (adult experimental) total PCBs, or ovary total PCBs; and the proportion of mature oocytes (Stage VI) is provided in Table 3. Correlation analysis suggested that ovary tissue total PCBs and proportion of stage VI oocytes were significantly negatively correlated (Spearman's Rank Correlation, 2-tailed test, 0.05, $n=7$, $r=-0.86$).

Overall, these results suggested that females collected from the target site sampling locations were not as reproductively fit as the external reference females, which were readily capable of reproducing. Further, the PCB and other COPCs that accumulated in the ovary tissue primarily

accounted for the reproductive stress observed in females collected from target site sample locations.

Sperm Characteristics

Results of sperm characterization of the external reference and target site male specimens are presented in Figure 9. Sperm counts from external reference males (R1-R3) were approximately 5.6×10^6 sperm/g tissue. The sperm counts from males collected at sites W-8 and EW-3 were less than 6.1×10^5 sperm/g tissue. Mean sperm counts in specimens collected from sites W-9a and W-6 (4.3 and 42.0 mg/Kg sediment total PCBs, respectively) were 2.4×10^6 and 2.0×10^6 sperm/g tissue, respectively. The relationship between sediment total PCBs and sperm count is expressed as analysis 13 of Table 3. The greatest rates of sperm cell abnormality, 37%, 42%, and 49%, were recorded in samples from sites W-6, W-8, and EW-3, (42.0, 120.0, and 30.0 mg/Kg sediment total PCBs), respectively. Sperm abnormalities were primarily localized to the anterior neck region and posterior head region resulting in varying degrees of axial flexure of the sperm tail. Overall, these results suggested that males collected from the target site sampling locations demonstrated signs of reproductive stress.

EMBRYONIC AND LARVAL DEVELOPMENT, GROWTH, AND MATURATION

Tissue Residue Analysis

Tissue residue analyses from larval specimens cultured in the laboratory derived from egg mass or larval specimen samples collected from several target site sampling locations, or reference larvae raised from artificially fertilized egg masses in the laboratory are summarized in Table 2. Overall, a limited number of egg masses were found at the target site sampling locations. As previously discussed, egg masses were collected from sites W-7a, W-4, and W-1; and larvae were collected from sites W-6 and EW-3. Complete tissue analysis results are provided as Appendix C. Total PCB levels were measured in one laboratory cultured larval sample from

each of sites W-7a, W-4, and W-1 (18.0, 0.5, and 0.2 mg/Kg, respectively), and sites W-6 and EW-3 (42.0 and 30.0 mg/Kg sediment total PCBs, respectively), respectively. Appendix IX pesticides and metals, dioxins and furans, and PAHs were not measured in these samples. Thus, analyses comparing biological response to COPCs were limited to total PCBs. The total PCB level in larvae cultured from artificially fertilized reference egg was 0.01 mg/Kg. Larval samples cultured in the laboratory in their respective site water and sediment from egg masses collected from sites W-7a, W-4, and W-1 (sites 34, 36, and 39, respectively) ranged from 0.05 mg/Kg (site W-1 [0.2 mg/Kg sediment total PCBs]) to 1.4 mg/Kg (site W-4 [0.5 mg/Kg sediment total PCBs]). Larval stage samples collected from laboratory cultures of field-derived larvae from sites W-6 (42.0 mg/Kg sediment total PCBs) and EW-3 (30.0 mg/Kg sediment total PCBs) contained 0.7 and 1.0 mg/Kg total PCBs, respectively. Contaminant exposure scenarios for the reference specimens exposed to target site W-8 (120.0 mg/Kg sediment total PCBs) and reference site MP (0.04 mg/Kg sediment total PCBs) water and sediment; and reference site MP water and sediment spiked with 30.0 mg/Kg Aroclor 1260 is provided as Appendix A. Reference larvae collected from artificially fertilized egg masses cultured in control water contained whole body total PCB levels of 0.04 to 0.07 mg/Kg. Reference larvae collected from artificially fertilized egg masses cultured in site W-8 water and sediment contained 0.4 mg/Kg total PCBs (Figure 10). Reference larvae collected from artificially fertilized egg masses cultured in control water and sediment, reference site MP water and sediment, and reference site MP water and sediment spiked with 30.0 mg/Kg Aroclor 1260 contained whole body total PCB residues of 0.004, 0.007, and 0.6 mg/Kg, respectively (Figure 11).

Artificially-Fertilized Egg Masses

Results from the artificial fertilization studies are presented in Figure 12. Because of the poor reproductive fitness of the target site frogs, particularly the female specimens, few artificial fertilization studies were completed successfully with specimen from the target site sampling locations. Of the target site sampling locations, only one set of eggs from site W-4 (0.5 mg/Kg sediment total PCBs) was successfully fertilized. Artificial fertilization attempts with stage V and VI oocytes were made with oocytes from sites W-1, EW-3, and W-1 (0.2, 30.0, and 18.0 mg/Kg sediment total PCBs, respectively). However, none of these attempts resulted in

fertilized embryos. Since the oocytes from females collected from the other sites were grossly immature (< stage III), artificial fertilization of egg masses was not performed. Greater than 50% of the oocytes from target site W-4 were successfully fertilized following artificial fertilization. Although nearly 90% of the fertilized egg mass was viable following fertilization, none of the developing embryos successfully hatched. A high degree of exogastrulation (ca. 75%) was noted in embryos from this clutch. In contrast, a fertilization rate of nearly 67% was achieved in the first trial using R1 external reference specimens. Approximately 97% of the fertilized embryos were normal appearing immediately following fertilization, although only 47% successfully hatched. In the second trial using oocytes from R3 external reference specimens, a fertilization rate of almost 98% was achieved with 100% appearing normal immediately following fertilization. Approximately 66% of the artificially fertilized R3 external reference embryos from trial 2 hatched. R2 external reference specimens were used only on a limited basis for artificial fertilization studies.

Developmental Evaluation of Field Collected Egg Masses or Larvae

Sample exposure scenarios for the culturing phase of the present study are provided in Appendix D. Because of the limited success obtaining artificially fertilized embryos from the target site sampling locations, attempts were made to collect egg masses, and in some cases hatchlings from each of the sampling locations. Although few *R. pipiens* egg masses were found at the target site sampling locations, egg masses were collected at the following sites: W-7a, W-4, and W-1 (18.0, 0.5, and 0.2 mg/Kg sediment total PCBs, respectively). As previously mentioned, hatchlings were collected at sites W-6 and EW-3 (42.0 and 30.0 mg/Kg sediment total PCBs, respectively). As previously indicated, the actual age difference between the egg masses and larvae collected and field exposure was negligible. Embryos from the artificially fertilized R3 reference egg masses were also cultured in reference site MP (0.04 mg/Kg sediment total PCBs) water and sediment. Due to the low number of specimens completing metamorphosis from the target sites relative to the external reference specimens, the developmental study was terminated prior to each specimen completing metamorphosis. The study period length utilized was sufficient for the majority of normally maturing larvae to complete metamorphosis. Since specimens from each treatment were allowed to progress towards metamorphosis, metamorphic completion and

mortality endpoints required longer exposure duration. Larval growth data was, however, collected over a shorter exposure period. Because larval growth as measured by linear length during the latter stages of prometamorphosis and metamorphic climax is not a suitable measure of development due to metamorphic changes, such as resorption of the tail, growth data was truncated prior to metamorphosis.

Rates of embryo/larval mortality of specimens cultured from the field collected egg masses or early hatchlings and artificially fertilized (external reference specimens only) egg masses are presented in Figure 13. Developmental phase inventory lists and data tables are provided as Appendix E. The mean larval mortality rates for embryos cultured from each of the target sites were substantially greater than observed in the external reference embryos. The mean mortality rate at the conclusion of larval culture for the reference site MP (0.04 mg/Kg sediment total PCBs) was 43.8%, whereas, the mortality rates for each of the target sites ranged from 87.7% (W-4, [0.5 mg/Kg sediment total PCBs]) to 100.0% (EW-3, [30.0 mg/Kg sediment total PCBs]) (Figure 14).

Developmental kinetic results for egg masses cultured in the laboratory from each site are provided in Figure 15. Evaluation of developmental kinetics, or rate of development, provided an assessment of the specific rates of development by assessing the stage of development relative to the time in culture. The rate of development of larvae cultured from sites W-7a, W-6, and EW-3 (18.0, 42.0, and 30.0 mg/Kg sediment total PCBs, respectively) showed slower development compared to the R3 larvae cultured in reference site MP (0.04 mg/Kg sediment total PCBs) water and sediment. A slightly lesser degree of slowed development was also noted in larvae cultured from egg masses collected from sites W-4 and W-1 (0.5 and 0.2 mg/Kg sediment total PCBs, respectively) compared to the R3 larvae cultured in reference site MP (0.04 mg/Kg sediment total PCBs) water and sediment. Generally, larvae cultured from sampling sites with greater sediment PCB and other COPC levels developed more slowly than larvae from lesser-contaminated, or uncontaminated sampling locations.

The incidence of mean malformation observed in larvae cultured from target sites W-7a, W-6, and EW-3 (18.0 mg/Kg, 42.0 mg/Kg, and 30.0 mg/Kg sediment total PCBs, respectively) were

11.8%, 14.2%, and 37.5%, respectively, during the entire culture period. The frequency of malformation in R3 specimens cultured in reference site MP media (0.04 mg/Kg sediment total PCBs) during each of the evaluation periods were 0.0% at days 0, 7, and 20, and 1.3% at day 42, 16.9% at day 48, and 2.5% at day 76, with the mean malformation of 3.4%. The frequencies of malformation in larvae from site W-1 (0.2 mg/Kg sediment total PCBs) were < 2.0% during all evaluation periods with the exception of the fourth evaluation period (day 31), which was 10.2%. The mean malformation for the duration of the exposure period for site W-1 was 1.9%. The frequencies of malformation in larvae from site W-4 at each respective evaluation period were < 3.0%, with the mean malformation of 0.7%.

Overall, the incidence mean malformation for specimens cultured from sites W-7a, W-6, and EW-3 (18.0, 42.0, and 30.0 mg/Kg sediment total PCBs, respectively) recorded during the entire culture period were generally greater than the mean malformation rate measured for the reference site specimens (Figure 16). With the exception of reference site MP, all sites exhibited larval malformations on study day 0, with sites W-7a, W-6, and EW-3 (18.0, 42.0, and 30.0 mg/Kg sediment total PCBs, respectively) ranging from 15.7% to 30% malformation. Sites W-4 and W-1 (0.46 mg/Kg and 0.15 mg/Kg sediment total PCBs) had minimal malformations (2.8% and 1.8%, respectively) on study day 0. Having malformations at the start of the study was not necessarily unusual, considering that the study specimens had been cultured in their original natal media at least six days prior to the study start day 0. This six day period accounted for field collection of the egg masses and development to ca. stage 20.

During the course of development, many malformed organisms died. Other malformations were resorbed during the process of metamorphosis, which is initiated at Gosner stage 30 and concludes at Gosner stage 46 when the larvae completely transforms into a metamorph. During metamorphosis, a complete remodeling of the larval body occurs to provide anatomical and physiological transition toward the terrestrial life phase. During metamorphosis, tadpole-specific organs are resorbed, including the tail, mouth parts, and gills; *de novo* synthesis of adult organs occurs, including the limbs; and remodeling of many systems, including the liver, nervous system, intestine, and skin (Shi, 2000). Since many of the organ systems are conserved between the tadpole and adult frog in a remodeled format, the latter is the most important. It is the

process of remodeling that causes external malformations to be transitory in some cases. This was not an isolated incident, as this has been observed in other similar situations (Fort and McLaughlin, 2003). Some of the malformations are incorporated into the remodeling process in the form of internal abnormalities observed in the metamorph specimens examined.

In the present study, the mean malformation frequency was calculated based on the average incidence of malformation at each observation event. Thus, this metric represents an average proportion malformed throughout the duration of the test. Importantly, the calculation of each malformation frequency reported was based on the initial number of live specimens at the beginning of the developmental study (day 0).

The proportion of each type of malformation observed in larvae raised in the laboratory from each site is presented in Figures 17-22. Malformations of the tail, fin, craniofacial region, eye, mouth, and, to a lesser extent, notochord and abdominal edema were noted as characteristic abnormalities in lab-reared larvae from sites W-7a, W-6, and EW-3 (18.0, 42.0, and 30.0 mg/Kg sediment total PCBs, respectively). Illustration of these malformations is provided in the project photo atlas included as Appendix F. More specifically, axial flexure of the tail resulted from abnormal myotome development. Notochord lesions in the anterior portion of the tail resulted in an osteolathyrigenic-like kinking of the tail. Visceral hemorrhage was noted in several of the specimens from each of these sites. Morphological distortion of the craniofacial and mouth region and incomplete development of the lens of the eye were also observed. Although some malformations were detected in reference site larvae, most were sporadically distributed. No true characteristic abnormalities, beyond baseline effects, were noted in malformed larvae from sites W-4 and W-1 (0.5 and 0.2 mg/Kg sediment total PCBs, respectively), and the external reference R3 specimens in site MP (0.04 mg/Kg sediment total PCBs) water and sediment.

Embryo-larval growth rates for larvae cultured from each of the target and reference sites are presented in Figure 23. The rate of larval growth in specimens cultured from each of sites W-7a, W-6, EW-3, and W-4 (18.0, 42.0, 30.0, and 0.5 mg/Kg sediment total PCBs, respectively) was less than the growth rate measured for the reference site specimens during the first 50 d of development. Reasonably consistent increases in larval growth were noted in specimens

cultured in site W-1 (0.2 mg/Kg sediment total PCBs) during the first 50 d. The rate of larval growth at ≥ 60 d of culturing was less than the growth rate measured in the reference specimens in specimens from sites W-7a and W-1 (18.0 and 0.2 mg/Kg sediment total PCBs, respectively). Generally no difference in growth rates relative to the reference specimens were detected in specimens from W-4 and W-6 (0.5 and 42.0 mg/Kg sediment total PCBs, respectively).

Larval Maturation and Metamorphosis

The ability of larvae cultured in the laboratory from each site represented in this study to successfully complete metamorphosis is presented in Figure 24. The mean proportion of metamorphosing larvae from the reference specimens cultured in laboratory water was approximately 62.5%. However only 5.6% of the reference specimens cultured in reference site MP water and sediment metamorphosed. The incidence of metamorphosis ranged from 0% to 3.0% in specimens cultured from the other sites. However, due to high rates of mortality during larval development, interpretation of these results is difficult. These results do not necessarily imply that larvae from the various cultures were incapable of completing metamorphosis, but simply that they had not at the completion of the study.

Crossover Exposure Studies

The impact of exposing reference specimens (R3) to site water and sediments from each of sites MP (0.04 mg/Kg sediment total PCBs) and W-8 (120 mg/Kg sediment total PCBs) on larval mortality is presented in Figure 25. No formal statistical analysis with the R1 treatment group was performed. The frequency of mortality at culture d 106 for R3 external reference specimens cultured in site W-8 (120 mg/Kg sediment total PCBs) media (Figure 25) was not significantly different than observed in R3 reference larvae cultured in reference site MP media (t-test, 1 tail, 0.05).

The impact of exposing reference specimens (R3) to water and sediments from each of sites MP (0.04 mg/Kg sediment total PCBs) and W-8 (120 mg/Kg sediment total PCBs) on larval

malformation is presented in Figure 26. The frequency of malformation in R3 larvae cultured in site W-8 media following 76 d of exposure was significantly greater than R3 larvae cultured in reference site MP media (t-test, 1 tail, 0.05). The mean frequencies of malformation recorded in R3 larvae cultured in site MP water and sediment was ca. 3.4%. The mean incidence of malformation in R1 and R3 larvae cultured in site W-8 water and sediment was approximately 19.1% and 19.8%, respectively. As previously mentioned, total PCB levels in R3 larval specimens cultured in target site W-8 sediment and water were appreciably greater than levels measured in R3 specimens cultured in reference site sediment and water (site MP). The primary characteristic malformations observed in either R1 or R3 specimens cultured in site W-8 (site 33) water and sediment were abdominal edema, abnormal developmental of the tail, notochord, face, eye, and mouth (Figures 27-29). Some visceral hemorrhage was also noted. Sporadic, random malformations were detected in the reference larvae (R1 and R3) cultured in reference site water and sediment (site MP). Although some were generally similar to malformations found in the cross over culture specimens, none were characteristic and a specific syndrome similar to the cross over culture specimens was not identified.

The impact of exposing reference site specimen (R3) to site water and sediments from each of sites MP (0.04 mg/Kg sediment total PCBs) and site W-8 (120 mg/Kg sediment total PCBs) on larval growth and developmental kinetics is presented in Figures 30 and 31. The rate of growth, as measured by linear length, was slightly slower in R3 specimens cultured in site W-8 media compared R3 specimens cultured in reference site MP sediment and water (t-test, 1 tail, 0.05). The overall rate of development, as measured by stage obtained relative to days in culture, was appreciably slower in the R3, and, more dramatically, in the R1 larvae cultured in site W-8 media than R3 specimen cultured in MP reference media.

The ability of larvae cultured in the laboratory, from each site represented in this study, to successfully complete metamorphosis is presented in Figure 32. The proportion of larvae completing metamorphosis relative to the initial number of specimens in culture in R3 specimen cultured in reference site MP media was not significantly different than the site W-8 crossover treatment (t-test, 1 tail, 0.05). The incidence of metamorphosis ranged from 5.3% in R1 to 8.8% in R3 specimens cultured in site W-8 (120 mg/Kg sediment total PCBs) media.

Aroclor 1260-Spiked Sediment

The effect of exposing reference specimens (R4) to water and sediments from site MP (site 40) spiked with 30.0 mg/Kg Aroclor 1260 on larval mortality is presented in Figure 33. Mortality rates (reference treatment 26.3% and 28.8% for the Aroclor 1260-spiked treatment) for either treatment scenario were not significantly different from each other (Wilcoxon Two-Sample Test, 1 tail, 0.05 and KW-ANOVA, $P=0.05$).

The impact of exposing reference specimen (R4) to site water and sediments from site MP (site 40) spiked with 30.0 mg/Kg Aroclor 1260 on larval malformation is presented in Figure 34. Final mean incidence of malformation recorded in R4 larvae cultured in site MP water and sediment spiked with 30.0 mg/Kg Aroclor 1260 was greater than the frequency of malformation measured in the R4 larvae cultured in site MP water and sediment (Wilcoxon Two-Sample Test, 1 tail, 0.05 and KW-ANOVA, $P=0.05$). The overall frequency of malformation recorded in R4 larvae cultured in site MP (site 40) water and sediment was 0%. The overall incidence of malformation in R4 larvae cultured in site MP (site 40) water and spiked sediment was 24.3%. Total PCB levels in R4 larval specimens cultured in reference sediment and water spiked with 30.0 mg/Kg Aroclor 1260 were greater than levels measured in R4 specimens cultured in reference site sediment and water (site MP). Characteristic malformations identified in larvae exposed to Aroclor 1260-spiked reference sediment site MP included abnormal development of the tail, craniofacial region, mouth, and eye (Figure 35). Visceral hemorrhage and blisters of the dorsal fin were also noted. The only malformation observed in the Aroclor 1260 spiking study not observed in the cultured target site larvae was abnormal brain development characterized as microcephaly. Specimens cultured in Aroclor 1260-spiked reference site sediment also demonstrated delayed development compared to reference organisms. In fact, a strong relationship between the sediment total PCB levels and developmental delay was observed in each of the primary study, crossover exposure study, and Aroclor 1260 spiked sediment study.

QUALITY ASSURANCE

Data Quality Objectives

The primary objective of this study was to assess the impact of PCB exposure on reproduction, development, and maturation in *R. pipiens* collected from respective sampling locations throughout the study area. Overall, this study provided a suitable attempt to determine the effect of PCB exposure to reproductively mature and early life stage *R. pipiens* on reproductive capacity and developmental fitness, based on the data collected from this study. The following data was collected in accordance with the specific quality assurance criteria established for this project, using the approach and methods established in the protocols established for this study, including whole body weight, ovary and testes weight, the number of egg mass oocytes per ovary, oocyte stage distribution, oocyte necrosis, artificial fertilization, early embryogenesis, metamorphosis, water and sediment contaminant analysis, and tissue residue analysis. Data verification using the approach described in the preceding sections was used to verify the results.

Data Quality Indicators

Data developed in the “*Rana pipiens* Reproduction and Development Study” met acceptable standards of precision, accuracy, completeness, representativeness, comparability, and sensitivity, as defined in Section 15 of the QAPP (Weston, 1999). No adult specimens were collected from the designated reference locations within the study area. Therefore, adult specimens collected from an external sampling location outside the study area were used as reference specimens. Six female specimens were collected from each sampling location with the exception of site E-1 and site W-4. Six male specimens were collected from each sampling location with the exception of site W-7a and site W-4. Sufficient female specimens were collected from each site, with the exception of site E-5, for whole body composite tissue analysis. Due to the poor reproductive condition of female specimens collected from each of the target site sampling locations, only one set of artificially fertilized oocytes was collected during the present study (site W-4). External reference specimens produced a sufficient quantity of

artificially fertilized embryos to conduct the proposed studies. Field egg masses or larvae were collected from sites W-7a, W-4, and W-1; and W-6 and EW-3 (18.0, 0.5, and 0.2; and 42.0 and 30.0, respectively, mg/Kg sediment total PCBs), respectively. No egg masses were found at the remaining target sampling locations.

DISCUSSION

REPRODUCTIVE EVALUATION

Results from the present study demonstrated that adult *R. pipiens* specimens collected from the various sampling locations throughout the study area showed marked signs of reproductive stress. Although both female and male specimens demonstrated signs of significant reproductive stress, the effects found in adult female specimens were more dramatic than observed in the male specimens, from a biological standpoint. Female specimens collected from each of the target site sampling locations were incapable of reproducing by artificial means in the laboratory, based on this evaluation. Only one artificial fertilization attempt was successful with the target site specimens. The successful trial occurred with one set of specimens collected from site W-4. However, development of this set of artificially fertilized embryos was extremely poor. On the contrary, little difficulty was encountered in artificially fertilizing external reference specimens (R1-R3). Further, early development and hatching success was reasonably high. Overall, it is unlikely that the female specimens collected from the target site sampling locations would have been capable of reproducing successfully in the field, under natural conditions. Although the external reference adult specimens were likely not exposed to the same environmental stressors as the adult specimens collected from target sites within the lower Housatonic River watershed, the magnitude of the adverse effects observed in the target specimens substantially reduces its importance.

As previously indicated, gravidity is a subjective assessment of reproductive status in the female, as marked by the presence of mature eggs. Thus, the presence of developing eggs in the ovary alone does not necessarily confer gravidity. Externally, gravidity was determined by assessing the degree of distension of the ovaries and determined by gently squeezing the flanks of the female. Thus, this measure of reproductive status was subjective and was confirmed by a specific examination of the ovaries and oocytes. Only external reference female specimens were found to be fully gravid. Several female frogs collected from sites W-7a, W-6, W-4, EW-3, and W-1 (18.0, 42.0, 0.5, 30.0, and 0.2 mg/Kg sediment total PCBs, respectively) were found to be

“slightly gravid”. In this case, a slight distension in the ovaries was noted. Specific examination of the ovaries or egg masses determined that the “slightly gravid” specimens were not reproductively fit. None of the females collected from E-5, W-9a, W-8, and E-1 (37.0, 4.3, 120.0, and 160.0 mg/Kg sediment total PCBs, respectively) were found to be gravid.

The timing of collection of adult *R. pipiens* from the target sites coincided with the normal onset of reproductive receptiveness and initiation of breeding activity. Adult specimens were collected between March 25, 2000 and April 22, 2000. Surface water temperatures in the study area were approximately 8 to 10° C at the time of collection. These temperatures represented the ideal environmental “triggers” for the frogs to emerge in the early spring and gather in breeding areas. Typically, males begin chorusing when water temperatures reach approximately 8° C, with oviposition peaking when water temperatures reach 10° C (Gilbert et al, 1994). Hine et al (1981) reported the occurrence of breeding when water temperatures reached or slightly exceeded 10° C in Wisconsin ponds.

With few exceptions, each of the reproductive status metrics evaluated indicated that the female specimens from the various target site sampling locations were reproductively impaired. Whole body and ovary weights (expressed as % of the whole body weight) were generally less in female specimens collected from each of the target sites than in the external reference female specimens. The most intriguing finding, however, was the marked immaturity of the oocytes in females collected from each of the target site sampling locations. Although some relatively insignificant gross pathology was noted in some of the ovaries examined from the target site specimens, the primary finding was that the oocytes were not mature. Considering that only mature oocytes can be fertilized, this finding was quite substantial. Conventional oocyte staging in amphibians ranged from stage I (immature) to stage VI (mature) (Dumont, 1972). In order for fertilization to occur, oocytes must be at stage VI. The process of oocyte maturation occurs cyclically over the course of the female’s reproductive years and begins with oogenesis early in development. As the oocyte develops, it grows in mass. Stages I and II oocytes are previtellogenic. During these stages, the lampbrush chromosomes begin to organize and prepare for condensation during the middle stage of oogenesis. During these early stages, lipid droplets form. Early vitellogenin

incorporation into the oocyte occurs during stage III and continues throughout stage IV. During the process of vitellogenesis, large, dense yolk platelets emerge and the separation in animal and vegetal poles (yolk) becomes more apparent in stages IV and V. Final maturation of the stage VI oocyte occurs at the onset of breeding and is stimulated by a series of complicated biochemical events in the reproductively mature female and the oocyte.

In this study, we found that the number of oocytes per g ovary tissue was reasonably similar in the specimens evaluated from each of the target and the external reference specimens. Thus, we could not determine the reproductive status of the ovary based on the gross number of developing eggs per g ovary weight. This was not necessarily surprising, considering that the gross change in weight of an oocyte for each stage obtained was difficult to measure using conventional technologies, and the natural variability in stage distribution made it difficult to quantify these differences statistically. Thus, evaluation of oocyte stage distributions in the ovary was important in this study. Immature oocytes were observed in female specimens collected from the remaining target site sampling locations. Developing oocytes were found in specimens from sites W-7a, W-4, EW-3, and W-1 (18.0, 0.5, 30.0, and 0.2 mg/Kg sediment total PCBs, respectively). However, none of the sites produced female specimens that possessed any biologically significant quantity of stage V or VI oocytes, with the exception of the external reference specimens. Therefore, the lack of success in artificially fertilizing oocytes from target site specimen was not surprising and appeared to be the primary biologically limiting step in the reproductive stress observed in the target site specimens evaluated in the present study. The length of period used to hold the adult *R. pipiens* prior to evaluation was not excessive and was consistent with the handling practices cited by Edgington et al. (2002), Parris (1999), Parris et al. (1999), Parris et al. (2001), and Porter and Licht (1985). Further, the holding time did not influence the outcome of our evaluation. The health of the specimens was monitored throughout the brief holding period and found not to be a factor.

It is unlikely that holding the frogs for a somewhat longer period of time would have improved the success of artificial fertilization or increased the distribution of mature oocytes. The process of oocyte maturation occurs immediately after oviposition, which had not occurred in the specimens examined. Maturation from an oogonia (oocyte) to either an ova (egg) or a follicular

cell occurs during the remainder of year prior to hibernation. During the spring breeding season, the oocyte matures, and when environmental conditions are favorable, oviposition occurs. Thus, holding them an additional month or so would not have had a large impact on the distribution of the oocytes. In addition, no signs that oviposition already occurred or that the female simply did not release her eggs during the previous year, as there was no evidence of cytolysis, as determined from ovary slides made from ovaries with immature oocytes.

Whole body total PCB levels in females collected and composited from the various sampling locations were reasonably consistent within the more highly contaminated sites (based on sediment total PCB levels) ranging from 1.8 mg/Kg (site W-6 [42.0 mg/Kg sediment total PCBs]) to 5.4 mg/Kg (site W-8 [120.0 mg/Kg sediment total PCBs]). Lesser whole body total PCB residues (0.3 and 0.2 mg/Kg at sites W-4 and W-1 [0.5 and 0.2 mg/Kg sediment total PCBs, respectively]) were found in specimens captured from the lesser-contaminated target sites. Total PCB levels found in whole body composites of the external reference specimens were appreciably less than that found in the specimens from the lesser total PCB contaminated sites. Thus, a reasonably strong relationship between whole body tissue levels and sediment total PCB levels from the various sampling locations existed which was not necessarily expected in the adults. The accumulation of total PCBs in the ovaries of females from the various target sites was highly variable. The variability in ovary total PCB levels ranged from 1.2-fold in specimens from the lesser contaminated site W-1 (0.2 mg/Kg sediment total PCBs) to 79.8-fold in specimens collected from the more highly COPC-contaminated site W-9a (4.3 mg/Kg sediment total PCBs). Little variation in ovary total PCB levels was found in the external reference specimens. Some variability was noted in offal total PCB residues from individual females collected from the target sites, but not nearly to the extent observed in the ovary tissue. In several of the specimens from which ovary samples were collected and analyzed for total PCB residues, extensive accumulation was found relative to the offal levels. Ovary total PCB accumulation is not necessarily surprising given the high lipid content of the oocytes within the ovaries. In contrast, several specimens showed slightly greater or similar levels of total PCBs in the offal samples compared to the ovary samples. Overall, these results indicated that the ovary was vulnerable to high levels of PCB accumulation. Results from the present study also suggested that accumulation profiles were likely affected by many different factors relating to

differences in environmental conditions, exposure scenarios, and biological differences in the specimens evaluated in the present study.

Since ovary total PCB levels were monitored in randomly selected individual specimens from each site, the toxicological effects observed in these specimens can be directly traced to the tissue burdens. The greatest levels of total PCB accumulation in the ovary were observed in specimens F003, F006, F003, and F009, collected from sites W-9a, W-7a, W-6, and EW-3 (4.3, 18.0, 42.0, and 30.0 mg/Kg sediment total PCBs, respectively). The specimens demonstrating the least total PCB accumulation was found in specimens F006, F005, F005, and F008 collected from sites W-9a, W7a, EW-3, and W-1, respectively (4.3, 18.0, 30.0, and 0.2 mg/Kg sediment total PCBs, respectively). Interestingly, the least amount of accumulation in the ovary was found in the specimens with the least mature oocytes. In specimens containing the greater levels of ovary total tissue PCBs, the oocytes were more advanced in developmental stage, although the majority was no greater than stage III. Since the more advanced oocytes contained a substantially greater concentration of yolk, which is primarily composed of lipids and lipoproteins, mid- to advanced stage oocytes would be more likely to accumulate hydrophobic contaminants, such as the COPCs considered in this study. However, even though more advanced oocytes were found in specimens containing substantially greater levels of ovary total PCBs, only a few stage VI oocytes were found, indicating that the final stage of maturation that involved hormonal induction of the final preparatory event known as germinal vesicle breakdown (GVBD) may have been inhibited. Further, since oogenesis and, to a greater extent, maturation, were inhibited in ovaries with tissue residues of as low as 0.3 mg/Kg. It was possible that the COPCs, considered in this study, did not disrupt the process of oogenesis as substantially as oocyte maturation events. Although it was likely that accumulation of PCB and other COPCs in the ovary tissue did not completely determine reproductive status in the adult female frog, offal levels in these specimen were relatively low, suggesting that either other sites of action were appreciably more sensitive to PCB and PCB-like COPC toxicosis, or that effects at the oocyte level were the primary driving factors in the reproductive dysfunction observed in this study. At this point, not enough information is available to completely resolve this question. However, new evidence presented in the “Comparison with Other Studies” section indicated that the effect of PCB and PCB-like COPCs on ovary status may lie at the oocyte level.

In the evaluation of data from the present study, the data correlations were based on the following criteria: 1) exclusion of juveniles from tissue residue and reproductive endpoints, 2) exclusion of reference animals for correlations with sediment PCBs and reproductive endpoints, 3) inclusion of all adult frogs, 4) inclusion of both gravid and non-gravid sexually mature females, and 5) segregation of tissue samples from reference animals in the correlation calculations (n=7) in Table 3. From this evaluation, only one relationship was found to be significant statistically, ovary tissue concentration and proportion of stage VI (mature) oocytes (Spearman's Rank Correlation, 2-tail test, $p=0.05$, $n=7$, and $r=-0.86$). Qualitative relationships were also found between whole body (offal) weight and either whole body (offal) tissue or ovary total PCBs; ovary weight and either whole body (offal) tissue or ovary total PCBs; and oocyte necrosis and ovary tissue total PCBs.

From this analysis, it is important to understand several critical points. First, the lack of significant statistical correlation should not be interpreted as an insignificant response. The plots corresponding to the correlation analysis are provided in Appendix D. These plots, in addition to the graphical representation of the data, demonstrated the substantial amount of variability associated for many of the endpoints at the lower sediment total PCB concentrations. In addition, data from only two high sediment total PCB sites were available, limiting the ability to evaluate relationships between total PCB levels and the biological endpoints, ultimately creating a higher degree of uncertainty. It is important to note that the collection of insufficient samples at the more highly PCB contaminated sites was not the result of inadequate sampling efforts, but potentially the impact from contamination. In several cases, a relatively flat concentration-response curve at a high magnitude of effect was observed such that a marked response was observed in all PCB concentrations tested. In these cases, Spearman's correlation analysis was not effective in translating the significance of the effects observed.

The second point is the importance of considering the biological significance of effects observed independent of statistical outcome. The biological significance of the results from the present study is discussed throughout the remainder of this report. In summary, the marked immaturity of eggs (including the lack of banded, stage VI oocytes), reduction in ovary weight, substantial

total PCB accumulation in the ovary, and the lack of significant numbers of egg masses found at contaminated natal sites suggested that female *R. pipiens* evaluated in this study were under reproductive stress. Although less conclusive, decreased sperm cell counts and increased sperm cell dysmorphology also suggested that male *R. pipiens* may also have been reproductively stressed.

Finally, the capacity of Aroclor 1260 to interfere with oocyte maturation (GVBD) provided a potential mechanistic link between exposure and the effects observed. More work will be required to fully establish the connection between PCB exposure, PCB accumulation, *in vivo* and *in vitro* effects on oocyte maturation, and ultimately, reproductive stress. However, as it currently stands, this relationship strengthens the biological relevance of the data collected.

Reproductive stress was also measured in the male specimens collected from the various target sites during this study. Since tissue total PCB data was only obtained in female specimens, due to the greater severity of toxicological response, comparisons of toxicological responses to tissue levels was not possible. Generally, reduced testis weight, reduced sperm count, and increased rates of sperm cell dysmorphogenesis were found in specimens collected from sites W-8, W-7a, and W-4 (120.0, 18.0, and 0.5 mg/Kg sediment total PCBs, respectively); W-8 and EW-3 (120.0 and 30.0 mg/Kg sediment total PCBs, respectively); and each target site, but site W-4 (0.5 mg/Kg sediment total PCBs), respectively. Thus, the rate of sperm cell dysmorphogenesis appeared to be the most sensitive reproductive endpoint measured in the male specimens collected. Reduction in sperm counts appeared to be the least sensitive, in part, due to natural variability. Further, the strongest relationship between sediment total PCB levels and toxicological effect was sperm dysmorphology. Some relationship was established between reduction in testis weight and sediment total PCB levels.

DEVELOPMENTAL EVALUATION

Due to the poor reproductive condition of the target site specimens, extremely limited quantities of artificially fertilized embryos were available to conduct the developmental phase of the

present study. Thus, egg masses and larvae from several of the sites were collected to evaluate development. As with the artificial fertilization component, limited numbers of *R. pipiens* egg masses were found in the field at the selected sites. This did not appear to be related to habitat issues, as habitat surveys prior to the study indicated that each site selected was suitable *R. pipiens* habitat. The lack of field eggs also did not appear to be due to the period in which collection was attempted, as surveys for *R. pipiens* egg masses were performed throughout the study. Reduction in *R. pipiens* egg masses may not have been a transient finding either, as similar findings were noted during the previous year. However, further local population analysis will be required to determine if this trend continues and the extent to which it translates to the local population level.

Although few *R. pipiens* eggs masses or larvae were found at the target site sampling locations, egg masses were collected at the following sites: W-7a, W-4, and W-1; or W-6 and EW-3, respectively. Embryos from the artificially fertilized external reference egg masses (R3) were also cultured in reference site MP water and sediment. Mortality rates measured in cultured egg masses from each of the target sites above were appreciably greater than the incidence of mortality measured in the external reference culture (R3 specimens in site MP water and sediment). The rate of development of larvae cultured from sites W-7a, W-6, and EW-3 (18.0, 42.0, and 30.0 mg/Kg sediment total PCBs, respectively) showed slowed development compared to the reference larvae (R3) cultured from reference site MP.

Overall, the incidence of malformation for specimens cultured from sites W-7a, W-6, and EW-3 (18.0, 42.0, and 30.0 mg/Kg sediment total PCBs, respectively) recorded during the entire culture period were generally greater than the frequency of malformation measured for the reference site specimens. Results from the present study suggested that larval mortality and malformation were influenced by both the maternal transfer of PCBs and environmental exposure to these contaminants (and accumulation) during development. Slower development was also observed more substantially in target site specimen from sites with the greatest levels of sediment total PCB contamination. Duration of exposure to these contaminants may have been a greater factor than the actual environmental concentration the organism was exposed to, unless the contaminants were supplied to the developing organism via a transgenerational route. It

should also be noted that only total PCBs were analyzed in the developing larvae, thus other COPCs, including PCB-like COPCs, were not considered in this evaluation.

Abnormal development of the tail, notochord, craniofacial region, eye, and mouth were noted as characteristic malformations in lab-reared larvae from sites W-7a, W-6, and EW-3 (18.0, 42.0, and 30.0 mg/Kg sediment total PCBs, respectively). More specifically, axial flexure of the tail resulted from abnormal myotome development. Notochord lesions in the anterior portion of the tail resulted in an “osteolathyrogenic-like” kinking of the tail. Visceral hemorrhage was noted in several of the specimens from each of these sites. Morphological distortion of the craniofacial and mouth region, and incomplete development of the lens of the eye were also observed. No characteristic abnormalities beyond baseline effects were noted in malformed larvae from sites W-4 and W-1 (0.5 and 0.2 mg/Kg sediment total PCBs, respectively), and the external reference site MP (0.04 mg/Kg sediment total PCBs). These malformations were similar in nature to those observed in other frog species, including other ranids and the South African clawed frog (*Xenopus laevis*). Thus, the syndrome produced appeared to be characteristic of exposure to these PCB or PCB-like contaminants.

The rate of larval growth in specimens cultured from each of sites W-7a, W-6, EW-3, and W-1 (18.0, 42.0, 30.0, and 0.2 mg/Kg sediment total PCBs, respectively) was generally less than the growth rate measured for the reference site specimens during the first 40 d of development. This reduction in growth rate appeared to coincide with the general trend of developmental delay found in specimens from most of the target sites, with the exception of sites W-4 and W-1 (site 0.5 and 0.2 mg/Kg sediment total PCBs, respectively) that had lower total PCB sediment levels. Reasonably consistent increases in larval growth were noted in specimens cultured from site W-1 between 40-80 d. Greater increases in growth between 40-80 d were noted in specimens from sites W-4 and W-6 (0.5 and 42.0 mg/Kg sediment total PCBs, respectively). The proportion of specimens completing metamorphosis for the target site sampling locations was generally less than the proportion of reference site specimens completing metamorphosis. This trend may have been skewed, somewhat, by the high incidence of mortality observed in the field egg masses from several of the target sites cultured in the laboratory.

CROSSOVER AND AROCLOR 1260-SEDIMENT SPIKING STUDIES

Due the limited number of fertilized embryos available to perform the crossover experiments, only exposure of R3 external reference specimens to site water and sediments from each of sites MP (0.04 mg/Kg sediment total PCBs) and W-8 (120 mg/Kg sediment total PCBs) and R4 external reference larvae to site W-8 were performed. The mortality rate for R3 specimens cultured in site W-8 media was similar to that observed in R3 reference larvae cultured in reference site MP media. In addition, mortality rates were similar for the treatment scenario exposing R4 external reference larvae to both reference site MP water and unspiked sediment and reference site MP spiked with 30 mg/Kg Aroclor 1260. These results provided additional evidence that transgenerational PCB transfer may have been responsible for early embryo-larval lethality, since low levels of PCBs would have been maternally transferred to the developing embryo. Overall, the malformation rates recorded in R3 larvae cultured in site W-8 media, and R4 larvae cultured in Aroclor 1260 spiked reference sediment and water (site MP) were generally greater than the malformation rates measured in R3 and R4 larvae cultured in reference site MP media (without the Aroclor 1260 spike), respectively.

As previously mentioned, total PCB levels in the external reference larval specimens cultured in target site W-8 (120.0 mg/Kg sediment total PCBs) water and sediment were greater than levels measured in external reference larvae cultured in reference site MP water and sediment, indicating that the larvae were accumulating total PCBs during the laboratory culture. Further, total PCB levels in R4 external reference larval specimens cultured in reference site MP water and sediment spiked with 30.0 mg/Kg Aroclor 1260 were greater than levels measured in R4 external reference specimens cultured in reference site water and sediment (site MP without the addition of Aroclor 1260). These results also corroborated the findings of the general egg mass culture studies that suggested that environmental exposure to total PCBs during development appeared to have had a greater bearing on developmental toxicity than maternal transfer of these toxicants via the oocyte. Clearly, both exposure routes affected developmental fecundity in the present study.

The rate of growth was slightly slower in R3 specimens cultured in site W-8 (120.0 mg/Kg sediment total PCBs) media compared to R3 specimens cultured in reference site MP sediment and water. The overall rate of development, as measured by stage obtained relative to days in culture, was appreciably slower in either the R3 or, more dramatically, the R1 larvae cultured in site W-8 water and sediment than R3 specimens cultured in site MP media. This developmental delay was also detected in the egg mass culture studies from the various target sites. Slowing the rate of development could have had a profound impact on the induction of abnormal development, as it increased the length of critical developmental windows, which in turn, increased exposure potential. Overall, this effectively increased the probability of a developmental anomaly occurring.

OTHER COPCS

Metals concentrations were above the lower sediment quality value at all sampling areas, including the MP reference site. The distribution of metals concentrations was fairly similar across locations in the study area, with the exception of site E-1, which had the highest metals concentrations. Upper sediment quality values were exceeded for chromium, copper, lead, mercury, nickel, silver, and zinc. Concentrations of some metal COPCs (chromium, mercury, nickel) were lower at the reference site compared to the study target sites, but the magnitude of the difference was not large, and there are a small number of reference area samples. These differences may be explained by the differences in substrate (predominantly coarse-grained material and lower total organic carbon (TOC) content in the reference sample). Overall, the levels of metal COPCs were similar between the study area and reference locations, with the exception of leopard frog sampling area E-1.

Organic carbon (OC)-normalized PAH concentrations were above sediment quality values at most sites in the study area. Three sites (E-5, W-9a, W-4) exhibited the highest PAH concentrations. With the exception of naphthalene, all PAH concentrations at the reference vernal pools were either low or below detection limits. Even with OC-normalization (reference

location sediments had low TOC), the PAH concentrations were lower at the reference location relative to several sites in the study area.

2,3,7,8-TCDD toxic equivalence (TEQ) were calculated using the Van den Berg et al. (1998) TEFs for fish as a means to compare sites. These were considered the best available surrogate for the amphibians. TEQ concentrations were generally low and exceeded 0.10 µg/kg TEQ only at Site E-1, which was also the location with the highest sediment total PCB concentration (160 mg/Kg).

Because of the uncertainty in relating water chemistry to effects on amphibians, the most relevant data are those collected in conjunction with effects measurements. These data were collected in conjunction with sediment sampling conducted for the amphibian developmental study (10 water samples). For the most part, all other COPCs measured in the water samples were not retained as COPCs. Dioxins and furans were measured in all of the water samples. However, no water quality benchmarks exist for screening. 2,3,7,8-TCDD TEQ for the leopard frog water samples ranged from 0.6 to 43.8 µg/L.

Estimating exposure using sediment and water chemistry has several limitations (Landrum et al. 1992); therefore, evaluating the accumulated tissue concentrations of COPCs provides useful information. Associating the effects endpoint with the tissue concentration of the contaminant causing the effect integrates many factors that mediate bioavailability. The basic principle of tissue residue assessment is that there is some proportional relationship between chemical concentrations in tissue at the site of toxic action and the toxic response of interest (Eaton and Klaassen 1995). The amount of contaminant at the toxic site of action in frogs is difficult to calculate; hence, a reasonable substitute is measurement of whole body residues of the contaminant. Toxic effects of many chemicals occur when certain critical body concentrations are reached. Therefore, the internal concentration of a COPC is used as a combined indicator of exposure and bioavailability.

Tissue concentrations of COPCs (metals, PAHs, dioxin/furans) other than PCBs were available for five adult experimental frogs (whole body minus egg mass/ovary tissue) and three reference

frog offal tissue samples (whole body minus reproductive tissues) for the leopard frog study. Appendix IX pesticides and metals, dioxins/furans, and PAHs were also measured in one offal sample from a reference specimen, as well as specimens from sites W-9a, W-7a, EW-3 (two samples), and W-1 (4.3, 18.0, 30.0, and 0.15 mg/Kg sediment total PCBs, respectively). Total Appendix IX pesticide levels in the reference offal samples ranged from 5.6 to 29.3 µg/kg, and the target site offal samples ranged from 8.9 to 31.1 µg/kg. Total dioxin/furan levels in reference offal samples ranged from ND to 127.7 ng/kg; whereas, offal samples from target site specimens ranged from ND to 21.3 ng/kg. Total PAH levels in reference offal samples ranged from 37.7 to 127.7 µg/kg, and offal samples from the study target sites ranged from 27.9 to 62.1 µg/kg. Sixteen metals were measured in leopard frog tissues, five of which (cadmium, chromium, copper, lead, mercury) are amphibian COPCs. The sixth metal, silver, was not measured in tissue. These metals were detected in all eight tissue samples, with the exception of lead (six samples) and mercury (three samples). The range of concentrations measured in tissues from in the study area generally bracketed the reference sample tissue concentrations, except that the highest concentrations of copper occurred in reference tissues.

R. pipiens tissue samples were analyzed for PAHs. Given that toxic effects of PAHs are known to be additive (Landrum et al. 1992; Swartz et al. 1995) and potentially aggravated with the addition of UV light, upper-bound potential exposure concentrations were derived. PAH concentrations were calculated using three methods (setting the detection limit as the actual value, using one-half the detection limit, and setting the detection limit equal to zero) that provided different levels of conservatism. The most conservative estimate of total PAH concentrations ranged from 0.03 to 0.08 mg/Kg. Dioxin/furan TEQs were calculated using the same bounding approach for ND values used for PAHs. By the most conservative method, dioxin TEQs were estimated to range from 0.056 to 0.106 µg/kg TEQs in *R. pipiens* tissues from the study area, and from 0.54 to 0.59 µg/kg TEQ in the reference tissues. These ranges decreased considerably if zeros were substituted for ND values, but the pattern of higher TEQs in the reference samples was still present.

Three exposure media were evaluated for amphibians: sediments, surface water, and tissue concentrations from samples collected at various stages of the amphibian life cycle (i.e., adult whole body, egg mass, early larval stage, late larval stage, metamorph stage). Contaminant levels in these media were compared to reproductive and developmental effects data obtained in the present study to evaluate relationships between contaminant concentrations in animal tissues and the ambient environment and adverse biological effects. Effects to the leopard frog are presented in this section, with comparisons of biological effects to COPC concentrations in various exposure media.

Endpoints representing each major life stage of leopard frogs were initially evaluated. The approach used to evaluate these endpoints was based on two objectives, determination of relative sensitivity of various life stages and evaluation of COPC concentration-response relationships. Relationships between exposure and effects form the basis of the quantitative concentration-response investigations. Two approaches were used to evaluate the relationships between effects endpoints and exposure routes; 1) a comparison of magnitude of observed effects at each contaminated location relative to the others, in the absence of the reference data, and 2) a comparative assessment that considered the effects from the study target sites in relation to results from reference sites. Because laboratory negative controls were not included in either of the amphibian developmental studies, site-by-site comparison to negative control treatments could not be performed. However, a comparative assessment of effects to COPC gradients was conducted. The evaluation of leopard frog concentration and response data was limited to a more qualitative presentation. Spearman's correlations were conducted only where sufficient paired exposure data existed on adult tissue samples (without the external reference specimens) and sediment total PCB concentrations.

RELATIONSHIP TO THE 2000 *R. SYLVATICA* VERNAL POOL STUDY

The primary objective in conducting the present study was to collect adequate data to determine if reproduction and development in *R. pipiens* was adversely affected in the lower Housatonic River study area. Further, this study attempted to fill data gaps in our understanding of the

impacts of PCB and PCB-like compound contaminated sediment and water on amphibian development and maturation. In the present study with *R. pipiens*, the most striking effect on the lifecycle of *R. pipiens* was reproduction. Reproductive fitness in specimens collected from the various target site sampling locations was adversely affected. Further, PCBs and the other COPCs appeared to be the primary cause of these effects. Although the developmental phase of the present study in *R. pipiens* was somewhat hampered by a limited number of specimens to work with due to the poor reproductive health of the species in this study area, adverse developmental effects were also found in specimens from the target site sampling locations. As found with the reproductive effects, this response was, at least in part, due to PCB exposure and accumulation.

In contrast, *R. sylvatica* reproduction did not appear to be adversely affected in the “2000 *R. sylvatica* Vernal Pool Study.” This marked difference in life phase response may be partially explained by the differences in life history strategies between the two species. Adult *R. sylvatica* females are explosive and, typically, impulsive breeders. The breeding season for *R. sylvatica* is reasonably short, often over several days to a week period, but extremely intensive. After egg laying is complete, the adults vacate the breeding pools, allowing the progeny to develop on their own. *R. pipiens*, however, are much more selective and deliberate during breeding season, often requiring several weeks to a month to complete breeding. Unlike *R. sylvatica*, *R. pipiens* adults remain in close contact with the egg masses during, at least, part of development. The more deliberate nature of mating and nurturing behavior in *R. pipiens* may have increased likelihood of adult exposure to environmental contaminants. On the contrary, the more rapid process of mating and less nurturing approach used by *R. sylvatica* may have decreased the likelihood of adult exposure during breeding. This scenario does not account for exposure and accumulation that occurs during the remainder of the year. Thus, other endocrinological and physiological differences between the species may have conferred sensitivity to a particular phase of the lifecycle. However, in both studies, developmental processes were adversely affected resulting in developmental delay and abnormal development.

Selection of two species with different life history strategies was significantly advantageous to the overall study of the impact of contamination in the lower Housatonic River on local

amphibian populations, as these two species broadly account the spectrum of reproductive and developmental strategies used by most amphibian species. However, it should be noted that this study also clearly points out that it cannot be assumed that all amphibian species are similar in terms of lifecycle dynamics, and extrapolation to other amphibian species should still be performed with some sense of caution.

COMPARISON WITH OTHER STUDIES

PCB and PCB-like contaminant concentrations in amphibian tissue collected from the field have been measured primarily in adult specimens, and are typically not accompanied by environmental concentrations. Thus, the presence of the COPCs in amphibian tissues is fairly well documented. However, specific bioconcentration factors (BCFs) have generally not been determined for amphibians. It has been generally assumed, based on several studies described in the following sections, that PCB and PCB-like contaminants accumulate in amphibians at least to the extent found in fish (Eisler, 1986).

Following a fire at a PCB warehouse, Phaneuf et al. (1995) investigated PCB concentrations in several species in both reference locations and downwind along the smoke plume produced by the fire. Total PCB levels in *R. clamitans* (green frog) and *R. pipiens* collected from the plume area were in the order of 94 µg/Kg and were as great as ca. 112 µg/Kg, whereas the mean value from the reference site was 7.5 µg/Kg. The investigators concluded that the measured values in the two frog species were less than that observed in bird eggs, similar to that observed in field mice, and greater than that observed in earthworms, and bird and muskrat liver. In a study designed to evaluate the movement of PCBs through the food chain in a national park in Spain contaminated with PCBs, the Spanish frog (*R. perezi*) was found to have almost 6 times more total PCBs than three different species of fish indigenous to the area (Hernandez et al., 1987). Biomagnification was only evident after frog-eating and fish egg-eating birds were examined. Concentrations in these birds were between 5- to 15-times the levels found in the fish and frogs. Elevated PCB concentrations were also detected in various tissues of mudpuppies (*Necturus maculosus*) collected from the St. Lawrence and Ottawa Rivers of Ontario from 1988 to 1992

(Bonin et al., 1995). Whole body total PCB residues ranged from 0.1 to 1.1 mg/Kg with a mean value of 0.4 mg/Kg. Female gonads contained an average of 0.4 mg/Kg total PCB. The most commonly identified congeners included PCB 118, 153, and 138. These concentrations and congeners were similar to those found in snapping turtle (*Chelydra serpentina*) eggs collected from the same sites. Further study of mudpuppies in the St. Lawrence River by Gendron et al. (1997) found more extensive levels of accumulation, with tissue residues ranging from 0.4 to 58.3 mg/Kg total PCB. However, these investigators also reported that the tissue levels of the non-ortho coplanar PCBs, which are typically the most toxic (Eisler and Beslisle, 1996), were far lower in concentration and ranged from 1.0 to 256.0 µg/Kg.

Under more controlled laboratory conditions, Jung and Walker (1997) evaluated dioxin uptake and depuration in American toads (*Bufo americanus*), *R. pipiens*, and *R. clamitans* exposed to spiked water as eggs or larvae for 24 h. These investigators found that the jelly coat surrounding the egg coat contained only 1.2% to 3.7% of the waterborne dioxin. Both frogs and toads accumulated dioxin in relation to the exposure level, with BCFs for each species ranging from 0.6 to 4.0. Interestingly, *R. pipiens* larvae accumulated 2.5 times more dioxin in 24 h than *B. americanus*. Depuration rates were relatively fast for all three species, with half-lives ranging from 1.0 to 7.3 d. Since PCB exposure in the present study was primarily via sediment exposure the BCFs calculated by Jung and Walker (1997) were not directly comparable to BCFs calculated from this study. However, Huang and Karasov (2000) determined that the half-life of PCB 126 in *R. pipiens* was approximately 763 d, which is substantially different from that found by Jung and Walker (1997) with dioxin. Since this study was conducted using oral dosing of food material (crickets), the difference in the rate of elimination and half-life may be the result of a combination of the different toxicants and exposure pathways evaluated.

Of the data that has been collected in adult *Rana sp.*, whole body total PCB levels vary widely depending on the study. Some of the greater whole PCB tissue residues recorded in previous studies were 2.1 mg Aroclor 1260/Kg dry weight in adult *Ambystoma maculatum* (spotted salamander) (Johnson et al., 1999), 1.6 and 1.7 mg Aroclor 1254:Aroclor 1260/Kg lipid weight in *R. pipiens* and *R. clamitans*, respectively (Gillan et al., 1998). However, few case studies have found whole body levels in ranid species at the concentrations found by these investigators in

more controlled studies. Bonin et al. (1995) found whole body total PCB levels in *Necturus maculosus* ranging from 113.0 µg/Kg to 1.1 mg/Kg. The whole body total PCB levels found in *R. pipiens* in our study ranged from 154.0 µg/Kg to 5.4 mg/Kg, with the majority of the samples above 1.8 mg/Kg. These concentrations are generally greater than those found in the previously cited studies. Several investigators have found rather extensive accumulation of PCBs in various adult amphibian tissues including gonads, liver, and eggs (Fontenot et al., 2000; Bonin et al., 1995; Huang et al., 1998; Huang et al., 1999; Huang and Karasov, 2000; and Gendron et al., 1997). In an evaluation of the distribution of PCB 126 in *R. pipiens*, following oral dosing of PCB-loaded crickets, Huang and Karasov (2000) found the liver, fat bodies, gonads, carcass, skin, and muscle tissue to be the primary organs for PCB retention. In this study, oral dosing of 0.35 or 5.0 mg/Kg in the crickets resulted in PCB bioaccumulation between 300 and 1,000 µg/Kg. In an *in situ* evaluation of the effects and bioaccumulation of Aroclor 1254 in adult *R. catesbeiana* (bullfrog) and *R. clamitans*, significant accumulation of PCBs in the liver and eggs was noted (Fontenot et al., 2000). In *R. catesbeiana*, liver PCB levels of ca. 2.3 ± 3.0 mg/Kg and egg PCB concentrations of 1.4 ± 2.0 mg/Kg were detected. Similar PCB levels in the liver and eggs were detected in *R. clamitans*. Bonin et al. (1995) found liver and gonad total PCB concentrations as great as 2.2 and 1.8 mg/Kg in *Necturus maculosus* collected from the Ottawa and St. Lawrence Rivers, respectively. Gendron et al. (1997) reported mean gonad total PCB concentrations ranging from 0.4 mg/Kg (reference site) to as great as 58.2 mg/Kg in *Necturus maculosus*, at a highly contaminated site. Aside from our studies, few studies (including work by Gutleb et al., 2000) specifically documented the accumulation of PCBs, in this case congener 126, in tadpoles. In that study, the investigators reported stage 25 *R. temporaria* (common frog) tadpoles containing approximately 5.4 mg PCB 126/Kg lipid weight. Since ambient and tissue total PCB levels were determined in the present study, BCFs for larval specimens were determined. BCFs for larval specimens from sites W-6 and EW-3 and the Aroclor 1260-spiked reference sediment (site MP) treatment were 0.03, 0.04, and 0.02, respectively. These values were somewhat lower than values determined for *R. sylvatica* in “2000 *R. sylvatica* Vernal Pool Study”. Whole body BCFs determined for adult *R. pipiens*, which were collected from sites W-9a, W-8, W-7a, W-6, EW-3, and E-1 were 0.45, 0.12, 0.08, 0.86, and 0.17, respectively. Ovary BCF values for specimens collected at sites W-9a, W-7a, W-6, and EW-3 were 5.6, 1.1, 0.4, and 0.2, respectively.

A substantially more limited database exists on the toxicological effects of PCBs in amphibians, particularly in field studies. Birge et al. (1978) found that the 4 d LC50 value for Aroclor 1254 in *R. pipiens*, *B. americanus*, and Fowler's toads (*B. fowleri*) were 3.5, 10.3, and 38.2 µg/Kg, respectively. Sensitivity to Aroclor 1254 and 1016 increased with the age, such that 4 d post-hatch larvae were markedly more sensitive than the immediate post-hatch larvae. Further, the toxicity of the mixtures increased with increasing percent chlorination, which was consistent with other studies with PCBs (Eisler, 1986 and Eisler and Beslisle, 1996). The teratogenic effects of PCBs on amphibians include skeletal defects, such as lordosis and scoliosis, and abdominal edema. These defects reported by Birge et al. (1978) are consistent with the abnormalities found in the present study. Bishop et al. (1991) found significant correlations between increasing malformation rates in snapping turtle embryos and PCB and PCDD/furans levels. However, the increased risk of abnormality was not significantly correlated with toxic equivalents in the eggs, indicating that individual concentrations of PCB congeners may be more important in assessing toxicity to snapping turtle eggs than toxic equivalents (TEQs) derived from rat, fish, and bird assays. Currently no TEQs exist for amphibian species.

Aside from the previously mentioned studies, the propensity of PCBs to induce reproductive and developmental effects in amphibian species is not widely understood. Most studies of PCB accumulation and effects have been performed in adults. However, few have focused on true reproductive endpoints. Of the reproductive effects found in the present study, the most intriguing is the inability of oocytes within female specimens collected from the target sampling sites to develop and mature properly. Exposure to environmental contaminants can adversely affect individuals, as well as, meta-populations of amphibians (Carey and Bryant, 1995). Most studies have focused on effects at the individual level. Extrapolating toxicological effects observed in individual specimens in the laboratory to effects at the meta-population level is extremely difficult and requires an adequate evaluation of adverse responses in the field. Negative effects at the meta-population level may be the result of multiple responses including lethal responses, sub-lethal responses, and modest changes in biochemical homeostasis (Blondeau and Baulieu, 1984; Kirk, 1988; Carey and Bryant, 1995; and Pickford and Morris, 1999). Sub-lethal responses include malformation, growth reduction and developmental delay.

Changes in biochemical homeostasis in amphibians resulting from perturbation of critical aspects of the endocrine system, such as reproductive hormonal pathways and the thyroid axis also provide additional stress.

Amphibian reproduction can be perturbed at a myriad of different sites within the body including, the brain, pituitary, thyroid, gonad, and liver (Pickford and Morris, 1999). Of these systems, the gonads appear to be a primary site of action for many EDCs in several species. For example, abnormal ovaries in female juvenile alligators from Lake Apopka, Florida have been identified in earlier studies (Cooke, 1971; Guillette et al., 1994; Crain et al., 1997; Guillette et al., 1995a; and Guillette et al., 1995b). The biochemical and histopathological effects of organochlorine pesticides and polynuclear aromatic hydrocarbons (PAHs) on the ovaries of fish have been documented (NIOSH, 1977 and Thomas and Budiantara, 1995). Thus, not only are EDCs capable of disrupting reproductive function by perturbing endocrine systems in adults, but also by inducing abnormalities in critical reproductive tissues.

The maturation of the amphibian oocyte represents the final stage of oogenesis, which ultimately prepares the oocyte for fertilization. Oocyte maturation is marked morphologically by germinal vesicle breakdown (GVBD) (Baulieu et al., 1978), and is induced by progesterone (Schuetz, 1967). Thus, maturation of the oocyte could potentially be disrupted by EDCs. Disruption of oocyte maturation events in *Rana pipiens* (Lin and Schuetz, 1983) and *X. laevis* (Baulieu et al., 1978) by estradiol and a synthetic estrogen has been demonstrated previously. Thus, maturation of the oocyte could potentially be disrupted by EDCs. Pickford and Morris (1999) previously hypothesized that progesterone-induced maturation of amphibian oocytes could be disrupted by environmental pollutants with anti-progestin activity.

The intriguing aspects of our findings in the present study were tied primarily to recent studies conducted, independently from this project, in our laboratory. We recently performed a preliminary study comparing the GVBD inhibition potential and OMPR binding affinity of Aroclor 1260, dieldrin, and several other toxicants using a high-throughput, laboratory-based oocyte GVBD assay (Fort et al., 2002, and D.J. Fort et al., in press). The relative GVBD inhibitory potential of the test substances evaluated was: ethinyl estradiol>>Aroclor

1260>atrazine>dieldrin. The relative binding affinity of these toxicants to the OMPR was expressed as: progesterone>>ethinyl estradiol (inhibitory)>testosterone (stimulatory)>atrazine (inhibitory)>Aroclor 1260 (inhibitory)>dieldrin (inhibitory). Washout studies, however, indicated that although the competitive binding affinity of ethinyl estradiol for the OMPR was the greatest of the compounds evaluated, testosterone, Aroclor 1260, and dieldrin were more tightly bound to the OMPR than ethinyl estradiol. These results suggested that organochlorine pesticides (methoxychlor is also an OMPR antagonist [Pickford and Morris, 1999]), and PCBs had the potential to alter oocyte maturation. Considering the large difference between the total PCB levels and the PAHs, dioxins/furans, and metals in the adult females, it seemed plausible that PCB and PCB-like COPCs may have been responsible for the inhibition of oocyte maturation. Gendron et al. (1997) found decreased corticosterone production in hypothalamo-pituitary axes of female *Necturus* exposed to PCBs in the wild. Thus, it is likely that PCB and PCB-like COPCS may have affected female reproduction at various biological sites within the organism. It is also interesting to note that corticosterone is a strong natural agonist of the OMPR and an inducer of precocious metamorphosis in amphibians. On a larger scale, these additional studies provide some mechanistic evidence for the disruption of reproductive fitness in amphibians by several of the COPCs evaluated in the present study, including PCB and PCB-like COPCs.

Virtually no information exists on the effects of PCBs on male reproductive status. A recent study (Travera Mendosa et al., 2001) indicated that several classes of organic contaminants were capable of altering various aspects of gonadal differentiation in larval aged amphibian tadpoles. We have noted the adverse impact of organic contaminants on male reproductive fitness (Fort et al., 2001). Additional studies will be required to determine which specific processes of gonadal differentiation and spermatogenesis are affected. The biological impact of reducing the number of sperm cells and increasing the rate of sperm cell dysmorphogenesis on reproductive performance also needs to be addressed so that these effects can be translated to effects at the local population level.

Slightly more information is available on the effects of PCB and PCB-like contaminants on amphibian development. This may be due to the general thought that early life-stage amphibians

are likely to be the most sensitive to exposure to PCBs in the environment. No significant effects of PCB 126 exposure (0.05-50 µg/L) in *R. pipiens* and *R. clamitans* tadpoles on hatching success, early malformations, body weight, snout-vent length (SVL), or organ mass weight were found by Rosenshield et al. (1999). These investigators, however, did find a decrease in survival and swimming speed, and an increase in abdominal edema in later stage tadpoles at the highest concentration tested. In the same study, an increasing proportion of metamorphosed specimens were found with increasing PCB concentration in both species, with the exception of the highest concentration, which was developmentally toxic. In the present study, as opposed to the “2000 *Rana sylvatica* Vernal Pool Study”, we did not observe this trend of increasing numbers of metamorphosed tadpoles from field collected egg masses from the more highly contaminated sampling sites. However, in the present study, more rapid embryo-larval lethality substantially reduced the number of specimens able to undergo metamorphosis, making evaluation of effects on metamorphosis difficult. It is plausible, as was noted by Rosenshield et al. (1999), that the developmental effects observed in this study, may have masked potential effects on metamorphosis.

In an *in situ* evaluation of the effects and bioaccumulation of Aroclor 1254 in *R. catesbeiana* and *R. clamitans*, by Fontenot et al. (2000), no effects on SVL and body weight were found. Jofre and Karasov (2000) found similar results, including an increase in percent metamorphosis, but that the time to metamorphosis was unaffected. These investigators also found increased incidence of edema in *R. clamitans* and *R. pipiens* exposed to 0.005-50 µg/L PCB 126. Gutleb et al. (1999) found no increase in early embryo-larval malformations or detrimental effects on growth in *X. laevis* exposed to 1.1 nM to 1.2 mM Aroclor 1254 for 4 d. However, these investigators did find that administration of Clophen A50 to females prior to breeding, in *X. laevis* and *R. temporaria*, altered retinoid signaling processes in developing larvae. *X. laevis* larvae exposed for 80 d to 7.7 pM-6.4 µM PCB 126 showed increasing numbers of malformations, including those types mentioned previously. Gutleb et al. (2000) found that administration of mixtures of Clophen A50 and PCB 126 caused prominent tail (including notochord) and eye malformations, in addition to fin and depigmentation defects, and edema. Finally, studies conducted by Reeder et al. (1998) found increased male:female sex ratios in cricket frogs (*Acris crepitans*) found at sites with high PCB and PCDF concentrations. The

primary effects documented in adult specimens, including recently metamorphosed animals, included necrosis of the kidney, and discoloration and necrosis of the liver (Huang et al., 1998). Of these malformations, the eye and fin malformations were perhaps the most intriguing, based on the consistency of this finding and potential connection to the disruption of retinoic acid homeostasis in the developing embryo. Since induction of lens development of the eye is induced by the biological morphogen, retinoic acid, disruption of this process may result in abnormal development of the eye. Retinoic acid signaling pathways are also required for normal development in amphibians and fish (Sive et al., 1990 and Vandersea et al., 1998). Huang et al. (2001) found that *R. pipiens* exposed to PCB 126 showed marked signs of oxidative stress.

Two recent studies, conducted by Kadokami et al. (2002) and Savage et al. (2002), further describe the potential effects of PCBs, as well as PCDDs and PCDFs, on amphibian development. The first study attempted to link the exposure to and accumulation of co-planar PCBs, PCDDs, and PCDFs on the occurrence of limb deformities in *R. ornativentris* (mountain brown frog) and *R. japonica* (Japanese brown frog) at a contaminated site relative to two selected reference sites. The incidence of forelimb malformation, characterized as polydactyly, in the effected site was ca. 1.0-2.0%, whereas the baseline effect was estimated to be approximately 0.1%. Since the whole body tissue concentrations of the contaminants of concern were similar between normal specimens collected at the target site and the reference site, the investigators concluded that this specific limb malformation was not the result of exposure to these contaminants. The total co-planar PCB levels recorded in the adult whole bodies of target sites and reference specimens (n=15 for target sites and n=2 for the reference site) ranged from 134.0 to 618.0 µg/Kg. No investigation of other potential causes of limb malformation, including parasites, was discussed. Further, the investigators only evaluated normal adult specimens and did not evaluate abnormal specimens of varying ages to evaluate potential differences with the normal specimens, limiting their ability to establish the conclusions drawn. In the present study and the “2000 *Rana sylvatica* Vernal Pool Study”, the incidence of limb defects was much less than the characteristic facial, mouth, and tail malformations. In the study by Savage et al. (2002), the effect of PCB-contaminated sediment, from Franklin County, New York, on developing *R. sylvatica* was evaluated. Healthy *R. sylvatica* tadpoles from an external site were exposed to either 20 or 40 g of sediment, originally containing ca. 326.0 mg/Kg total PCBs, for

12 d with mortality and behavioral effects (activity and swimming speed) monitored. Further, two different exposure scenarios either allowed the tadpoles to come in direct contact with the sediment or not have direct contact with the sediment. In either case, the specimens exposed to 40 g of sediment accumulated approximately 128.0 and 33.0 mg/Kg total PCBs in the sediment contact and non-contact treatments, respectively. Likewise, tadpoles exposed to the 20 g sediment treatment (sediment contact/non-contact) accumulated total PCB levels of 22.0 and 6.0 mg/Kg. Regardless of amount of sediment used, significant larval mortality was observed. However, greater mortality was noted in the specimens exposed directly to the sediment than in those in the non-contact treatment. These investigators also found that swimming behavior and activity were, likewise, affected by these treatments as well. However, a greater effect on activity was noted in the non-direct sediment contact treatments. These results were also similar to those found in the present study, as well as the “2000 *R. sylvatica* Vernal Pool Study”.

Results from the previous studies described in the preceding paragraphs were reasonably similar to the results obtained in the present study. These previous studies point out that PCB and PCB-like contaminants are capable of altering normal reproductive function, inducing abnormal development, altering metamorphic patterns and sexual development, and causing organ system pathology. The malformations observed in previous studies were similar to those observed in the present study. Although the gonads have been a primary focus for bioaccumulation of PCB and PCB-like contaminants, little previous work has been performed to understand abnormalities in gonad development in relation to PCB exposure. In addition, an increase in the percent of specimens that metamorphosed and pigmentation problems associated with improper development of the skin was also observed in the present study. Overall, the results from the present study are more dramatic than those reported previously. However, based on sediment PCB levels and tissue residues, the lower Housatonic River study area was appreciably more contaminated than the sites studied in the other reports discussed.

Huang and Karasov (2000) made an astute observation in their studies of liver pathology in *R. pipiens* exposed to radio labeled PCB 126. These investigators suggested that liver pathology was not necessarily related to the dose administered, but was better correlated with the length of exposure in adult specimens. Trans-generational transport of the COPCs may play a more

significant role in early developmental toxicity. However, data gaps prevent us from determining the impact of trans-generational contaminant transfer on longer-term developmental processes. It is important to understand that relationships between time of exposure, tissue accumulation, and effects induced are not necessarily significant in the induction of early embryo-larval malformations. As was found in this study, the relationship between early embryo-larval malformations and tissue residues was usually not strong. More important was the exposure to the developmentally toxic material at critical time periods, or windows, during development. In this case, if exposure occurs at the appropriate concentration at a critical time of development, an abnormality may result. Because this dichotomy between short-term embryological and longer-term developmental and pathological effects exists, determination of toxic thresholds and adequate protection levels is extremely difficult. The extent of contamination in the Lower Housatonic River study area compounds this difficulty.

Results from the present study, as well as, most studies conducted to date have focused primarily on effects at either the individual level or the local population level. In fact, few studies, if any, adequately combined both field and laboratory components, nor provide extrapolation of laboratory-based individual data to field-based local population effects (Fort and McLaughlin, in press). The impact of organochlorine contamination (primarily PCBs) on amphibian populations in Southwestern Michigan was recently evaluated by Glennemeier and Begnoche (2002). Although these investigators found toxicological effects of PCB contaminated sediment in developing *R. pipiens* and *R. utricularia* larvae, no apparent effects were observed at the population level. Population surveys were based on three separate calling surveys conducted over an unknown portion of one year (1997) and limited time-constrained visual encounter surveys during an unknown portion of 1998. These investigators found that ranid adults and larvae collected from the field sites contained total PCB levels lower than that found in the sediments. The maximum total sediment PCB levels in the sediment in the Glennemeier and Begnoche (2002) study was 39 mg/Kg total PCBs. Glennemeier and Begnoche (2002) hypothesized that the apparent lack of population-level effects of PCBs in the field could be explained by limited contaminant accumulation rather than low physiological sensitivity to chronic PCB exposure. This work adds to a growing controversy over the actual sensitivity of amphibian populations to organochlorine contaminants. Glennemeier and Begnoche (2002)

studies support studies by Fontenot et al. (1996) and Harris et al. (1998a and 1998b) that have suggested that amphibian populations are less negatively affected than other taxa by organochlorine contaminants.

The adequacy of the population surveys from the Glennemeier and Begnoche (2002) is difficult to determine due to both the limited nature of the surveys and the lack of adequate population modeling. It is likely that without modeling over a five to ten year period, negative population effects would not necessarily be observed. In addition, the suggestion that bioaccumulation is directly relative to biological effects and that population level effects will not be observed in taxa that do not extensively bioaccumulate PCBs is not necessarily founded as biotic and abiotic exposure during critical phases of the lifecycle is more likely to be significant factor. In addition, accumulation of contaminants, including the COPCs considered in the present study, in amphibians should not necessarily be assessed based on whole body analysis, since critical tissues, such as the ovary and liver, tend to accumulate substantially more PCBs than the remainder of the body. The present study strongly suggested that the reproductive organs in female *R. pipiens* were not only a toxicological target, but also a site for extensive bioaccumulation relative to the whole body. Finally, if Huang and Karasov (2000) are correct in their assertion of the importance of the temporal variable in mediating the toxicological effects of PCBs in anurans, the length of exposure during critical periods of the lifecycle may be more important than the actual exposure concentration or extent of accumulation.

It is possible that more significant remediation standards for these COPCs in the environment will be required to protect amphibians in the affected area from accumulation and potential longer-term effects than shorter-term early developmental effects. Both outcomes must be considered to adequately protect amphibians from the adverse effects of PCBs in the environment. However, future studies are needed to directly compare the individual and local population level sensitivities to laboratory and field exposure to PCBs.

CONCLUSIONS

Results from the present study demonstrated the negative impact of a myriad of contaminants, most notably PCB and other COPCs, on *R. pipiens* reproduction, development, and maturation in the Lower Housatonic River watershed. Of the effects detected, however, the most striking effect observed was on reproductive fitness. Reproductive fitness was compromised in both male and female specimens, with the most marked toxicological effects being noted in the females evaluated. Elevated PCB residues were found in various *R. pipiens* tissues evaluated throughout this study. While the leopard frog study cannot unequivocally implicate PCBs as the primary contaminant responsible for the observed effects in the leopard frogs, the accumulation of other COPCs in tissue samples was not as great as that of PCB accumulation. The concentrations of the other COPCs detected in specimen tissue samples from target sites were not appreciably greater, and occasionally less than levels found in reference specimens. For example:

- 1) Two of the greatest total metals concentrations came from reference animals. The greatest total metals value for a target site specimen was within the range of the two reference values.
- 2) The greatest measured total pesticides concentration in the reference samples was 30.0 ng/g. The greatest measured value in the target site specimens was 31.0 ng/g. Overall, tissue concentrations in the target site specimens were within the same range as the reference specimens.
- 3) Dioxins and furans were not detected in the adult experimental analysis frogs. The greatest total dioxin/furan value detected was from a reference animal (128 pg/g).
- 4) The greatest measured total PAH concentration was in a reference female.
- 5) The target specimens' tissue total PCB concentrations were frequently one or more orders of magnitude greater than levels measured in the reference specimens.

The extent of bioaccumulation was determined by both geographical and temporal factors. Thus, both the location of the adult frogs and developing egg masses, and duration of environmental

exposure appeared to determine the extent of contaminant accumulation in the tissue. Reasonably strong relationships were established between the incidence of reproductive stress and embryo-larval malformation, and levels of PCBs and other COPCs in both sediment and respective tissues. Results from the present study suggested that both maternal transfer and environmental exposure and accumulation of PCBs contributed to the adverse developmental effects observed. Although complex non-interactive and interactive relationships between the contaminants identified and the influence of other non-chemical stressors must be considered, results from the present study indicated that the most significant factor in the toxicological effects observed was exposure and accumulation of PCB and other COPCs during critical phases of the life-cycle. Further, it was nearly impossible to discriminate the effects resulting from exposure to PCBs relative to those induced by PCB-like COPCs. Overall, this study has identified a biologically significant impact of PCBs and other COPCs on reproductive stress observed in *R. pipiens*.

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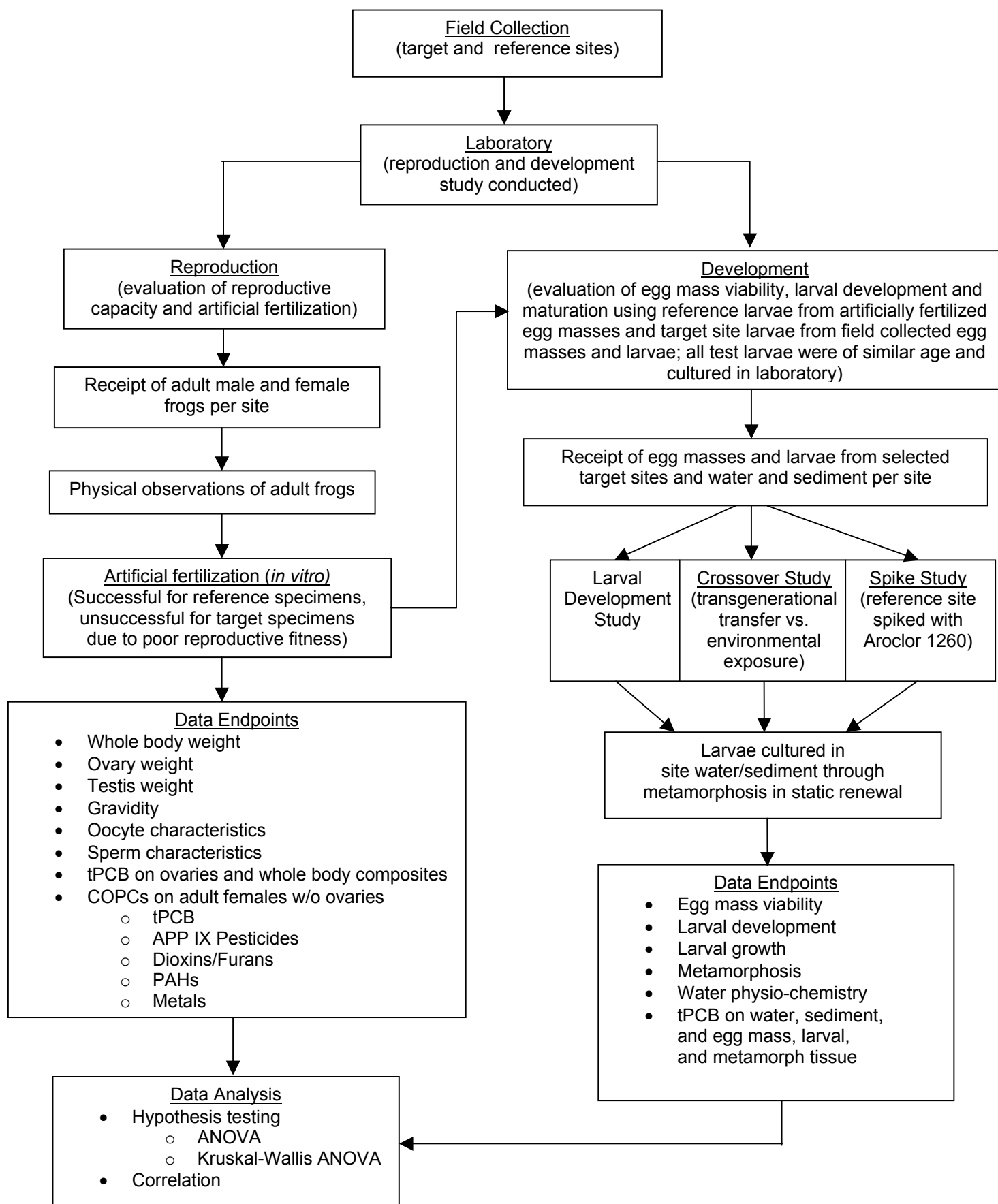
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Appendix A

Reproduction / Development Study 2000 Overview

Water, Sediment, and Culture Sample Exposure Scenarios for Developmental, Crossover, and Spike Studies

FORT ENVIRONMENTAL LABORATORIES
HOUSATONIC RIVER PROJECT
***Rana pipiens* REPRODUCTION / DEVELOPMENT STUDY 2000 OVERVIEW**



HOUSATONIC RIVER PROJECT
***RANA pipiens* DEVELOPMENT STUDY 2000**
SITE WATER/SEDIMENT/CULTURE IDENTIFICATION

Site Location		Sample Number		
Weston ID	Woodlot ID	Water	Sediment	Larval Culture
TA03RP31	E-5	H3-SW000027-0-0M30 (Rec'd 3/31/00)	H3-SE001246-0-0000 (Rec'd 3/31/00)	No Sample Sent ¹
TA04RP32	W-9a	H3-SW000030-0-0M30 (Rec'd 3/31/00)	H3-SE001249-0-0000 (Rec'd 3/31/00)	No Sample Sent ¹
TA04RP33	W-8	H3-SW000029-0-0M30 (Rec'd 3/31/00)	H3-SE001248-0-0000 (Rec'd 3/31/00)	H3-TA04RP33-0-TP01 ¹ (Rec'd 1 tadpole 5/4/00) No study conducted
TA08RP34	W-7a	H3-SW000028-0-0M30 (Rec'd 3/31, Added 4/19)	H3-SE001247-0-0000 (Rec'd 3/31, Added 5/8) 196.8g sed/3L water	H3-TA08RP34-0-EM01 (Rec'd 4/19/00) (Hatched 4/19-20/00)
TA08RP35	W-6	H3-SW000032-0-0M30 (Rec'd 3/31, Added 5/4)	H3-SE001251-0-0000 (Rec'd 3/31, Added 5/9) 238.2g sed/3L water	H3-TA08RP35-0-TP01 (Rec'd 5/4/00) Stage 20
TA10RP36	W-4	H3-SW000031-0-0M30 (Rec'd 3/31, Added 4/16)	H3-SE001250-0-0000 (Rec'd 3/31, Added 5/8) 247.2g sed/3L water	H3-TA10RP36-0-EM01 H3-TA10RP36-0-EM02 (Rec'd 4/14/00) (Hatched 4/16-17/00)

HOUSATONIC RIVER PROJECT
***RANA pipiens* DEVELOPMENT STUDY 2000**
SITE WATER/SEDIMENT/CULTURE IDENTIFICATION

Site Location		Sample Number		
Weston ID	Woodlot ID	Water	Sediment	Larval Culture
TA10RP37	EW-3	H3-SW000034-0-0M30 (Rec'd 3/31, Added 5/4)	H3-SE001253-0-0000 (Rec'd 3/31, Added 5/9) 227.1g sed/3L water	H3-TA10RP37-0-TP01 (Rec'd 5/4/00) Stage 20
TA12RP38	E-1	H3-SW000035-0-0M30 (Rec'd 3/31/00)	H3-SE001245-0-0000 (Rec'd 3/31/00)	H3-TA12RP38-0-EM01 H3-TA12RP38-0-EM02 (Rec'd 4/18/00) Salamanders No study conducted
TA12RP39	W-1	H3-SW000033-0-0M30 (Rec'd 3/31, Added 4/20)	H3-SE001252-0-0000 (Rec'd 3/31, Added 5/8) 203.7g sed/3L water	H3-TA12RP39-0-EM01 (Rec'd 4/20/00) (Hatched 4/23-24/00)
TAWLRP25	WML	No Sample Sent	No Sample Sent	No Sample Sent ¹
TAMPRP40	MP	H9-SW000049-0-0Y24 (Rec'd 5/30, Added 6/5)	H9-SE001279-0-0000 (Rec'd 5/30, Added 6/5) 296.4g sed/3L water	R3 ² Larval Composite (Hatched 5/21/00)
TA3MRP26	TP	No Sample Sent	No Sample Sent	No Sample Sent ¹

HOUSATONIC RIVER PROJECT
***RANA pipiens* DEVELOPMENT STUDY 2000**
SITE WATER/SEDIMENT/CULTURE IDENTIFICATION

Site Location		Sample Number		
Weston ID	Woodlot ID	Water	Sediment	Larval Culture
Crossover Study		H3-SW000029-0-0M30 (Rec'd 3/31, Added 5/9)	H3-SE001248-0-0000 (Rec'd 3/31, Added 5/9) 251.4g sed/3L water	R1-F001 ³ Larvae (Hatched 5/3/00)
R1 Larvae in TA04RP33 Water/Sediment	W-8			
Crossover Study		H3-SW000029-0-0M30 (Rec'd 3/31, Added 6/5)	H3-SE001248-0-0000 (Rec'd 3/31, Added 6/5) 251.4g sed/3L water	R3 ² Larval Composite (Hatched 5/21/00)
R3 Larvae in TA04RP33 Water/Sediment	W-8			
Crossover Study		H9-SW000049-0-0Y24 (Rec'd 5/30, Added 6/5)	H9-SE001279-0-0000 (Rec'd 5/30, Added 6/5) 296.4g sed/3L water	R3 ² Larval Composite (Hatched 5/21/00)
R3 Larvae in TAMPRP40 Water/Sediment	MP			
Spike Study		H9-SW000049-0-0Y24 (Rec'd 5/30, Added 10/30)	H9-SE001279-0-0000 (Rec'd 5/30, Added 10/30) 251.4g sed/3L water Spiked w/Arochlor 1260 (30mg/kg sediment)	R4 ⁴ Egg Mass
R4 Larvae in TAMPRP40 Water/Sediment (spiked/unspiked)	MP			

¹ Development studies were not conducted on RP Sites 31, 32, 33, 38, 25, and 26 due to limited or no sample available.

² R3 refers to third set of reference adult *R. pipiens*.

³ R1 refers to first set of reference adult *R. pipiens*.

⁴ R4 refers to artificially fertilized *R. pipiens* reference egg masses.

Appendix B

Chain-of-Custody Documentation For Field Samples

Chain-of-Custody Documentation For Tissue Samples

Field Samples

Chain-of-Custody Documentation

Lab Batch Number
WESR01-RSTSD2 07504

CHAIN-OF-CUSTODY/LAB WORK REQUEST

Chain of Custody
2066b

Client <u>Housatonic River Site</u> Client Work Order # _____ Work Order # _____ Project Contact/Phone # <u>A. Haines</u> Lab Name <u>STOVER Group</u> Turn Around Time (TAT) _____ Deliverable Type: _____ Account # _____			Number/Type Container Volume (Per Container) Preservatives (Per Container)	Water Solid Water (ml) Solid (oz.) Water Solid															
			ANALYSES REQUESTED	App.IX VOA	App.IX BNA	O-C Pest.	O-P Pest.	PCB	Herb.	Dioxin/Furans	App.IX Metals	CN	S	TOC	Grain Size	Free Reproduction Study			
Lab Sample No.	Client ID/Description	Matrix QC Chosen	COC Matrix	Collected Date/Time	Indicate Method Number														
		MS/MSD/SL																	
013 014 *	H3-SE001249-0-0000	SL	W	3/25/00 1354													X		
	H3-SW000030-0-0025	SL	W	3/27/00													X		

Special Instructions:

* - Site water/sediment for location TA04RP32

Matrix Codes

S - Soil
 SD - Sediment
 SO - Solid
 SL - Sludge
 W - Water
 O - Oil
 A - Air
 DS - Drum Solids
 DL - Drum Liquids
 L - EP/TCLP Leachate
 WP - Wipes
 X - Other
 F - Fish

Date/Revisions:

- _____
- _____
- _____

LAB USE ONLY

Samples were:

- 1) Shipped _____ or Hand Delivered _____
 Airbill # _____
- 2) Temperature Blank
 Temp. 8 °C
- 3) Received in Good Condition
☒ (Y) or (N)
- 4) Labels Indicate Properly Preserved
☒ (Y) or (N)
- 5) Received Within Holding Times
☒ (Y) or (N)
- Discrepancies Between Samples Labels and COC Record?
 (Y) or ☒ (N)

COC Tape was:

- 1) Present on Outer Package
☒ (Y) or (N)
- 2) Unbroken on Outer Package
☒ (Y) or (N)
- 3) Present on Sample
☒ (Y) or (N)
- 4) Unbroken on Sample
☒ (Y) or (N)
- COC Record Present Upon Sample Reception?
☒ (Y) or (N)

NOTES:

Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time
<u>Scott Campbell</u>		3/27/00	0815				
	<u>Lisa Morgan</u>	3/28/00	0900				

Chain of Custody
2067

009
010

98C-2128 9/15/98

Chain of Custody
2069a

Special Instructions: x = Rama pipen * = Site sed/water for Location TA 06 RP 35 Pool W-6				Matrix Codes S - Soil SD - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids L - EP/TCLP Leachate WP - Wipes X - Other F - Fish		Date/Revisions: 1. _____ _____ 2. _____ _____ 3. _____ _____ _____				LAB USE ONLY			
Samples were: 1) Shipped _____ or Hand Delivered _____ Airbill # _____ 2) Temperature Blank Temp. _____ °C 3) Received in Good Condition (Y) or (N) 4) Labels Indicate Properly Preserved (Y) or (N) 5) Received Within Holding Times (Y) or (N) Discrepancies Between Samples Labels and COC Record? (Y) or (N)				COC Tape was: 1) Present on Outer Package (Y) or (N) 2) Unbroken on Outer Package (Y) or (N) 3) Present on Sample (Y) or (N) 4) Unbroken on Sample (Y) or (N) COC Record Present Upon Sample Reception? (Y) or (N) NOTES:									
Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time	Page 1 of 2					
Scott Campbell		3/27/00	0845										
	Jim Morgan	3/28/00	0900										

Chain of Custody
20696

Special Instructions: <div style="font-size: 1.2em; font-family: cursive;">* - Site water from location TA06 RP35.</div>				Matrix Codes S - Soil SD - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids L - EP/TCLP Leachate WP - Wipes X - Other F - Fish		Date/Revisions: 1. _____ 2. _____ 3. _____				LAB USE ONLY					
						Samples were: 1) Shipped _____ or Hand Delivered _____ Airbill # _____ 2) Temperature Blank Temp. <u>7.0</u> °C 3) Received in Good Condition <input checked="" type="radio"/> (Y) or (N) 4) Labels Indicate Properly Preserved <input checked="" type="radio"/> (Y) or (N) 5) Received Within Holding Times <input checked="" type="radio"/> (Y) or (N) Discrepancies Between Samples Labels and COC Record? (Y) or <input checked="" type="radio"/> (N)				COC Tape was: 1) Present on Outer Package <input checked="" type="radio"/> (Y) or (N) 2) Unbroken on Outer Package <input checked="" type="radio"/> (Y) or (N) 3) Present on Sample <input checked="" type="radio"/> (Y) or (N) 4) Unbroken on Sample <input checked="" type="radio"/> (Y) or (N) COC Record Present Upon Sample Reception? <input checked="" type="radio"/> (Y) or (N) NOTES:					
						Page <u>2</u> of <u>2</u>									
Relinquished by		Received by		Date		Time		Relinquished by		Received by		Date		Time	
Scott Campbell		Shirley Morgan		3/27/06		0645									
				3/28/06		0900									

Lab Batch Number
WESR01-RSTS02-07509

CHAIN-OF-CUSTODY/LAB WORK REQUEST

Chain of Custody
2070

Client <u>Housatonic River Site</u>				Number/Type Container		Water																			
Client Work Order #						Solid																			
Work Order #				Volume (Per Container)		Water (ml)																			
Project Contact/Phone # <u>A. Maines</u>						Solid (oz.)																			
Lab Name <u>STOVER Group</u>				Preservatives (Per Container)		Water																			
Turn Around Time (TAT)						Solid																			
Deliverable Type:																									
Account #																									
				ANALYSES REQUESTED				App.IX VOA	App.IX BNA	O-C Pest.	O-P Pest.	PCB	Herb.	Dioxin/Furans	App.IX Metals	CN	S-	TOC	Grain Size	Frag. Reproduction					
Lab Sample No.	Client ID/Description	Matrix QC Chosen		COC Matrix	Collected Date/Time	Indicate Method Number																			
		MS	MSD/LD																						
001	H3-TA12RP39-0-m001			X	3/25/00 0740																				
002	m002				3/26/00 1030																				
003	m003																								
004	m004																								
005	m005																								
006	m006																								
007	F001																								
008	F002																								
009	* H3-SF001252-0-0000			SD	3/27/00 1020																				
010	* H3-SW00033-0-0M27			W																					

Special Instructions: X- Rana pipiens *- Site water/led from Location TA12RP39 Pool W-1				Matrix Codes S - Soil SD - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids L - EP/TCLP Leachate WP - Wipes X - Other F - Fish				Date/Revisions: 1. _____ 2. _____ 3. _____				LAB USE ONLY							
												Samples were: 1) Shipped _____ or Hand Delivered _____ Airbill # _____ 2) Temperature Blank Temp. <u>6.4</u> °C 3) Received in Good Condition <u>(Y)</u> or (N) 4) Labels Indicate Properly Preserved <u>(Y)</u> or (N) 5) Received Within Holding Times <u>(Y)</u> or (N) Discrepancies Between Samples Labels and COC Record? (Y) or <u>(N)</u>							
												COC Tape was: 1) Present on Outer Package <u>(Y)</u> or (N) 2) Unbroken on Outer Package <u>(Y)</u> or (N) 3) Present on Sample <u>(Y)</u> or (N) 4) Unbroken on Sample <u>(Y)</u> or (N) COC Record Present Upon Sample Reception? <u>(Y)</u> or (N) NOTES:							
Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time												
Beck Campbell		3/27/00																	
	Lia Meyer	3/28/00	1600																

Chain of Custody
2071

①
007
008
009
010
011
012

98C-2128 9/15/98

Chain of Custody
2072

010
011

98C-2128 9/15/98

Lab Batch Number
WESR01-RST502 07503

CHAIN-OF-CUSTODY/LAB WORK REQUEST

Chain of Custody
2076

Client <u>Housatonic River Site</u> Client Work Order # _____ Work Order # _____ Project Contact/Phone # <u>A. Harnes</u> Lab Name <u>STOVER Group</u> Turn Around Time (TAT) _____ Deliverable Type: _____ Account # _____				Number/Type Container Water _____ Solid _____ Volume (Per Container) Water (ml) _____ Solid (oz.) _____ Preservatives (Per Container) Water _____ Solid _____		<table border="1"> <tr> <td>App.IX VOA</td> <td>App.IX BNA</td> <td>O-C Pest.</td> <td>O-P Pest.</td> <td>PCB</td> <td>Herb.</td> <td>Dioxin/Furans</td> <td>App.IX Metals</td> <td>CN</td> <td>S</td> <td>TOC</td> <td>Grain Size</td> <td>Reproduction</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>																App.IX VOA	App.IX BNA	O-C Pest.	O-P Pest.	PCB	Herb.	Dioxin/Furans	App.IX Metals	CN	S	TOC	Grain Size	Reproduction							
App.IX VOA	App.IX BNA	O-C Pest.	O-P Pest.	PCB	Herb.	Dioxin/Furans	App.IX Metals	CN	S	TOC	Grain Size	Reproduction																													
ANALYSES REQUESTED				Indicate Method Number																																					
Lab Sample No.	Client ID/Description	Matrix QC Chosen		COC Matrix	Collected Date/Time																																				
		MS	MSD/LD																																						
014	H3-TA08RP35-0-moo7			X	3/28/00 0930																																				
015	FOO6			+	+																																				

Special Instructions: <u>x2 Rana pipien</u> <u>Pool W-6</u>				Matrix Codes S - Soil SD - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids L - EP/TCLP Leachate WP - Wipes X - Other F - Fish				Date/Revisions: 1. <u>① mislabeled organism</u> <u>moo7 → FOO6 Lm 3/29/00</u> 2. _____ 3. _____				LAB USE ONLY Samples were: 1) Shipped _____ or Hand Delivered _____ Airbill # _____ 2) Temperature Blank Temp. _____ °C 3) Received in Good Condition (Y) or (N) 4) Labels Indicate Properly Preserved (Y) or (N) 5) Received Within Holding Times (Y) or (N) Discrepancies Between Samples Labels and COC Record? (Y) or (N)							
COC Tape was: 1) Present on Outer Package (Y) or (N) 2) Unbroken on Outer Package (Y) or (N) 3) Present on Sample (Y) or (N) 4) Unbroken on Sample (Y) or (N) COC Record Present Upon Sample Reception? (Y) or (N) NOTES:																			
Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time												
<u>Scott Campbell</u>	<u>Lisa Morgan</u>	<u>3/28/00</u>	<u>1410</u>																
		<u>3/29/00</u>	<u>0900</u>																

Lab Batch Number
WESR01-RST502 0750

CHAIN-OF-CUSTODY/LAB WORK REQUEST

Chain of Custody
2077

Client <u>Housatonic River Site</u>				Number/Type Container		Water																									
Client Work Order #				Solid																											
Work Order #				Volume (Per Container)		Water (ml)																									
Project Contact/Phone # <u>A. Haines</u>				Solid (oz.)																											
Lab Name <u>STOUBER Group</u>				Preservatives (Per Container)		Water																									
Turn Around Time (TAT)				Solid																											
Deliverable Type:																															
Account #																															
				ANALYSES REQUESTED		App. IX VOA		App. IX BNA		O-C Pest.		O-P Pest.		PCB		Herb.		Dioxin/Furans		App. IX Metals		CN		S-		TOC		Grain Size		Reproduction	

98C-2128 9/15/98

Chain of Custody
2085

[illegible]

Chain of Custody
2088

Special Instructions: <div style="font-size: 1.2em; font-family: cursive;">Site water for location H3-TA12RP38</div> <div style="font-size: 1.2em; font-family: cursive; margin-top: 20px;">Pool ^(SW) E-1</div>				Matrix Codes S - Soil SD - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids L - EP/TCLP Leachate WP - Wipes X - Other F - Fish				Date/Revisions: 1. _____ 2. _____ 3. _____				LAB USE ONLY			
Samples were: 1) Shipped _____ or Hand Delivered _____ Airbill # _____ 2) Temperature Blank Temp. <u>7.0</u> °C 3) Received in Good Condition <input checked="" type="radio"/> (Y) or (N) 4) Labels Indicate Properly Preserved <input checked="" type="radio"/> (Y) or (N) 5) Received Within Holding Times <input checked="" type="radio"/> (Y) or (N)				COC Tape was: 1) Present on Outer Package <input checked="" type="radio"/> (Y) or (N) 2) Unbroken on Outer Package <input checked="" type="radio"/> (Y) or (N) 3) Present on Sample <input checked="" type="radio"/> (Y) or (N) 4) Unbroken on Sample <input checked="" type="radio"/> (Y) or (N) COC Record Present Upon Sample Reception? <input checked="" type="radio"/> (Y) or (N)											
Discrepancies Between Samples Labels and COC Record? (Y) or <input checked="" type="radio"/> (N)				NOTES:											

Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time
Scott Capell		3/30/00	1530				
	Joe Meyer	3/31/00	1000				

Page 1 of 1

Chain of Custody
2089

Special Instructions: site soil/water for location H3-TA08 RP34 Pool W-7A				Matrix Codes S - Soil SD - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids L - EP/TCLP Leachate WP - Wipes X - Other F - Fish		Date/Revisions: 1. _____ 2. _____ 3. _____				LAB USE ONLY																																															
						Samples were: 1) Shipped _____ or Hand Delivered _____ Airbill # _____ 2) Temperature Blank Temp. <u>7.0</u> °C 3) Received in Good Condition (<input checked="" type="checkbox"/>) or (N) 4) Labels Indicate Properly Preserved (<input checked="" type="checkbox"/>) or (N) 5) Received Within Holding Times (<input checked="" type="checkbox"/>) or (N)				COC Tape was: 1) Present on Outer Package (<input checked="" type="checkbox"/>) or (N) 2) Unbroken on Outer Package (<input checked="" type="checkbox"/>) or (N) 3) Present on Sample (<input checked="" type="checkbox"/>) or (N) 4) Unbroken on Sample (<input checked="" type="checkbox"/>) or (N) COC Record Present Upon Sample Reception? (<input checked="" type="checkbox"/>) or (N)																																															
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Relinquished by</th> <th style="width: 15%;">Received by</th> <th style="width: 15%;">Date</th> <th style="width: 15%;">Time</th> </tr> </thead> <tbody> <tr> <td>Scott Campbell</td> <td></td> <td>3/30/00</td> <td>1530</td> </tr> <tr> <td></td> <td>Aisa Morgan</td> <td>3/31/00</td> <td>1000</td> </tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>				Relinquished by	Received by	Date	Time	Scott Campbell		3/30/00	1530		Aisa Morgan	3/31/00	1000													<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Relinquished by</th> <th style="width: 15%;">Received by</th> <th style="width: 15%;">Date</th> <th style="width: 15%;">Time</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>		Relinquished by	Received by	Date	Time																					Discrepancies Between Samples Labels and COC Record? (Y) or (<input checked="" type="checkbox"/>)			
Relinquished by	Received by	Date	Time																																																						
Scott Campbell		3/30/00	1530																																																						
	Aisa Morgan	3/31/00	1000																																																						
Relinquished by	Received by	Date	Time																																																						
Page <u>1</u> of <u>1</u>								NOTES:																																																	

Chain of Custody
2092

Special Instructions: X = Rana pipiens COC was cut during opening of box. LM-3-31-00				Matrix Codes S - Soil SD - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids L - EP/TCLP Leachate WP - Wipes X - Other F - Fish		Date/Revisions: 1. _____ 2. _____ 3. _____							
								LAB USE ONLY					
								Samples were:					
								1) Shipped _____ or Hand Delivered _____ Airbill # _____					
								2) Temperature Blank Temp. _____ °C					
								3) Received in Good Condition (Y) or (N)					
								4) Labels Indicate Properly Preserved (Y) or (N)					
								5) Received Within Holding Times (Y) or (N)					
								Discrepancies Between Samples Labels and COC Record? (Y) or (N)					
								COC Tape was:					
								1) Present on Outer Package (Y) or (N)					
								2) Unbroken on Outer Package (Y) or (N)					
								3) Present on Sample (Y) or (N)					
								4) Unbroken on Sample (Y) or (N)					
								COC Record Present Upon Sample Reception? (Y) or (N)					
								NOTES:					
								Page of					

Lab Batch Number
WESR-25042-07504

CHAIN-OF-CUSTODY/LAB WORK REQUEST

Chain of Custody
2097

Client Housatonic River Site				Number/Type Container		Water																									
Client Work Order #				Volume (Per Container)		Solid																									
Work Order #				Preservatives (Per Container)		Water																									
Project Contact/Phone # T. D'Amico / A. Haines						Solid																									
Lab Name Silver Group																															
Turn Around Time (TAT)																															
Deliverable Type:																															
Account #																															
				ANALYSES REQUESTED		App LX VOA		App LX RNA		O-C		OP		PCB		Urb		Dioxin/Furans		App LX Metals		CN		S		TOC		Gran Size		Free	

98C-2128 9/15/98

98C-2128 9/15/98

98C-2128 9/15/98

Chain of Custody
2143

Special Instructions: <i>X = Rana pipiens</i> Location: <i>TA12RP39</i> <i>Leopard Frog Reproduction Study</i> <i>Pool: W-1</i>				Matrix Codes S - Soil SD - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids L - EP/TCLP Leachate WP - Wipes X - Other F - Fish		Date/Revisions: 1. <i>① 4001 = F007</i> <i>F007 = m007 - missexed</i> <i>in field Lm - 4/12/00</i> 2. _____ 3. _____				LAB USE ONLY			
Samples were: 1) Shipped _____ or Hand Delivered _____ Airbill # _____ 2) Temperature Blank Temp. _____ °C 3) Received in Good Condition (Y) or (N) 4) Labels Indicate Properly Preserved (Y) or (N) 5) Received Within Holding Times (Y) or (N) Discrepancies Between Samples Labels and COC Record? (Y) or (N)				COC Tape was: 1) Present on Outer Package (Y) or (N) 2) Unbroken on Outer Package (Y) or (N) 3) Present on Sample (Y) or (N) 4) Unbroken on Sample (Y) or (N) COC Record Present Upon Sample Reception? (Y) or (N) NOTES:									

Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time
<i>Sam P. Bl</i>		<i>4/11/00</i>	<i>1302</i>				
	<i>Joie Mager</i>	<i>4/12/00</i>	<i>0900</i>				

Page ___ of ___

Lab Batch Number
WESR061-75032-07493

CHAIN-OF-CUSTODY/LAB WORK REQUEST

Chain of Custody
2155

Client Housatonic River Site				Number/Type Container		Water																													
Client Work Order #				Solid																															
Work Order #				Volume (Per Container)		Water (ml)																													
Project Contact/Phone # <i>Ahaines/T. Delong</i>				Solid (oz.)																															
Lab Name <i>Stover Group</i>				Preservatives (Per Container)		Water																													
Turn Around Time (TAT)				Solid																															
Deliverable Type:				ANALYSES REQUESTED		App IX VOA		App IX BNA		O-C Pest.		O-P Pest.		PCB		Herb.		Dioxin/Furans		App IX Metals		CN		S		TOC		Grain Size		Leopard frog reproductive study		2000		1	
Account #																																			
Lab Sample No.	Client ID/Description	Matrix QC Chosen		COC Matrix	Collected Date/Time	Indicate Method Number																													
		MS	MSD/LD																																
019	H3-TA12RP38-0-EM01			X	4/17/00 1550																														
020	H3-TA12RP38-0-EM02			X	4/17/00 1550																														
					</																														

Lab Batch Number

WESR01-RSTSP2-07502

CHAIN-OF-CUSTODY/LAB WORK REQUEST

Chain of Custody

2179

[illegible][illegible]

WESRBI-RSTS42-075

Chain of Custody
2182

[illegible]

Special Instructions: <div style="font-size: 1.2em; font-family: cursive;"> x = Rana pipien egg mass Leopard Frog reproduction Study </div>				Matrix Codes S - Soil SD - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids L - EP/TCLP Leachate WP - Wipes X - Other F - Fish				Date/Revisions: 1. _____ 2. _____ 3. _____				LAB USE ONLY			
Relinquished by <div style="font-size: 1.2em; font-family: cursive;">Scott Campbell</div>				Received by <div style="font-size: 1.2em; font-family: cursive;">Robert Rogers</div>				Date <div style="font-size: 1.2em; font-family: cursive;">4/19/00</div>				Time <div style="font-size: 1.2em; font-family: cursive;">1600</div>			
Relinquished by 				Received by 				Date 				Time 			

Location W-1

Samples were:
 1) Shipped _____ or Hand Delivered _____
 Airbill # _____
 2) Temperature ~~Blank~~ Temp. 9.0 °C
 3) Received in Good Condition (Y) or (N)
 4) Labels Indicate Properly Preserved (Y) or (N)
 5) Received Within Holding Times (Y) or (N)
 Discrepancies Between Samples Labels and COC Record? (Y) or (N)

COC Tape was:

1) Present on Outer Package (Y) or (N)

2) Unbroken on Outer Package (Y) or (N)

3) Present on Sample (Y) or (N)

4) Unbroken on Sample (Y) or (N)

COC Record Present Upon Sample Reception? (Y) or (N)

NOTES:

Page 1 of 1

WESTPORT-25102-07502

2186

[illegible]

Special Instructions: x = Rana pipiens Leopard Frog Reproduction Study				Matrix Codes S - Soil SD - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids L - EP/TCLP Leachate WP - Wipes X - Other F - Fish		Date/Revisions: 1. _____ _____ 2. _____ _____ 3. _____ _____ _____				LAB USE ONLY			
Samples were: 1) Shipped _____ or Hand Delivered _____ Airbill # _____ 2) Temperature Blank Temp. _____ °C 3) Received in Good Condition (Y) or (N) 4) Labels Indicate Properly Preserved (Y) or (N) 5) Received Within Holding Times (Y) or (N) Discrepancies Between Samples Labels and COC Record? (Y) or (N)				COC Tape was: 1) Present on Outer Package (Y) or (N) 2) Unbroken on Outer Package (Y) or (N) 3) Present on Sample (Y) or (N) 4) Unbroken on Sample (Y) or (N) COC Record Present Upon Sample Reception? (Y) or (N) NOTES:									
Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time	Page 1 of 1					
Scott Campbell		4/21/00	1300										
Jim Morgan		4/21/00	0900										

[illegible]

WESAD1-R5TS02-07503

CHAIN-OF-CUSTODY/LAB WORK REQUEST

Chain of Custody

2205

[illegible][illegible]

Special Instructions: x - Rana pipiens tad poles Loc - W-6 (42UP-2)				Matrix Codes S - Soil SD - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids L - EP/TCLP Leachate WP - Wipes X - Other F - Fish		Date/Revisions: 1. _____ 2. _____ 3. _____		LAB USE ONLY			
								Samples were: 1) Shipped _____ or Hand Delivered _____ Airbill # _____ 2) Temperature Blank Temp. <u>13</u> °C 3) Received in Good Condition <u>(Y)</u> or (N) 4) Labels Indicate Properly Preserved <u>(Y)</u> or (N) 5) Received Within Holding Times <u>(Y)</u> or (N) Discrepancies Between Samples Labels and COC Record? (Y) or <u>(N)</u>			
COC Tape was: 1) Present on Outer Package <u>(Y)</u> or (N) 2) Unbroken on Outer Package <u>(Y)</u> or (N) 3) Present on Sample <u>(Y)</u> or (N) 4) Unbroken on Sample <u>(Y)</u> or (N) COC Record Present Upon Sample Reception? <u>(Y)</u> or (N) NOTES:											
Relinquished by Received by Date Time				Relinquished by Received by Date Time		Date Time		Page <u>11</u> of <u>11</u>			
Scott Cunniff Robert Rizzo											
5/3/00 1622											
5/4/00 1018											

WESRHLRSTSD2-07511

Chain of Custody
2206

Special Instructions: <div style="font-family: cursive; font-size: 1.2em; margin-top: 10px;"> X - Rana pipiens egg mass LAC - W-8 (14UP-5) </div>				Matrix Codes S - Soil SD - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids L - EP/TCLP Leachate WP - Wipes X - Other F - Fish				Date/Revisions: 1. _____ 2. _____ 3. _____			
LAB USE ONLY											
Samples were: 1) Shipped _____ or Hand Delivered _____ Airbill # _____ 2) Temperature <u>Blank</u> Temp. <u>13</u> °C 3) Received in Good Condition <input checked="" type="radio"/> (Y) or (N) 4) Labels Indicate Properly Preserved <input checked="" type="radio"/> (Y) or (N) 5) Received Within Holding Times <input checked="" type="radio"/> (Y) or (N) Discrepancies Between Samples Labels and COC Record? (Y) or <input checked="" type="radio"/> (N)				COC Tape was: 1) Present on Outer Package <input checked="" type="radio"/> (Y) or (N) 2) Unbroken on Outer Package <input checked="" type="radio"/> (Y) or (N) 3) Present on Sample <input checked="" type="radio"/> (Y) or (N) 4) Unbroken on Sample <input checked="" type="radio"/> (Y) or (N) COC Record Present Upon Sample Reception? <input checked="" type="radio"/> (Y) or (N) NOTES:							
Relinquished by <div style="font-family: cursive;">Scott Campbell</div>		Received by <div style="font-family: cursive;">Robert Rogers</div>		Date <div style="font-family: cursive;">5/3/00</div>		Time <div style="font-family: cursive;">1620</div>		<div style="font-size: 2em; margin: 0;">11</div> <div style="font-size: 0.8em; margin-top: 5px;">Page <u> </u> of <u> </u></div>			

98C-2128 9/15/98

Lab Batch Number
07688 07691

Chain of Custody
2237

Special Instructions: 55-gallons of water from Muddy Pond SITE 40				Matrix Codes S - Soil SD - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids L - EP/TCLP Leachate WP - Wipes X - Other F - Fish		Date/Revisions: 1. _____ 2. _____ 3. _____		LAB USE ONLY							
Samples were: 1) Shipped _____ or Hand Delivered _____ Airbill # _____ 2) Temperature Blank Temp. _____ °C 3) Received in Good Condition <input checked="" type="radio"/> Y or (N) 4) Labels Indicate Properly Preserved (Y) or (N) 5) Received Within Holding Times (Y) or (N) Discrepancies Between Samples Labels and COC Record? (Y) or (N)				COC Tape was: 1) Present on Outer Package (Y) or (N) 2) Unbroken on Outer Package (Y) or (N) 3) Present on Sample (Y) or (N) 4) Unbroken on Sample (Y) or (N) COC Record Present Upon Sample Reception? <input checked="" type="radio"/> Y or (N) NOTES:											
Relinquished by		Received by		Date		Time		Relinquished by		Received by		Date		Time	
Dust Control		Julie C. Clark		5/24/00		1200									
				5/9/00		1425									
Page 1 of 1															

Tissue Samples

Chain-of-Custody Documentation

COC ID 2547

Chain of Custody Record



Client EPA
Site Name Housatonic River Project
W.O.
Laboratory GERG

Contact Name	Kelly Spittler
Contact Phone No.	610-701-3953
Turn-around-Time	
Sampler	Woodlot Alt

Analysis Requested by Group by Container

(number listed for total containers per analysis group)

Preservative

[illegible]

Client EPA
Site Name Housatonic River Project
W.O.
Laboratory GERG

Chain of Custody Record



(number listed for total containers per analysis group)

Lab Batch Number

[illegible]Crossover Larvae, *Rana pipiens*

First priority for analysis are samples dated 5/18/00 to 5/30/00

Second priority for analysis are samples dated from 6/00 to 12/00

Third priority for analysis are samples dated from 1/00 to 5/15/00

COC Tape was present on outer package	Y	N
---------------------------------------	---	---

COC Tape was unbroken on outer package	Y	N
--	---	---

COC Tape was present on sample	Y	N
--------------------------------	---	---

COC Tape was unbroken on sample Y N

Received in good condition Y N

Labels Indicate Properly Preserved	Y	N
------------------------------------	---	---

Received within Holding Time	Y	N
------------------------------	---	---

Temp of Cooler when Received, C°			
1	2	3	4

Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time

COC ID 2549

Chain of Custody Record



Client EPA
Site Name Housatonic River Project
W.O. _____
Laboratory GERG

Contact Name	Kelly Spittler
Contact Phone No.	610-701-3953
Turn-around-Time	
Sampler	Woodlot Alt

Analysis Requested by Group by Container

(number listed for total containers per analysis group)

Preservative

Lab Batch Number

[illegible]

Field Remarks/Comments	
------------------------	--

Egg Mass/Ovary, *Rana pipiens*

First priority for analysis are samples dated 5/18/00 to 5/30/00

Second priority for analysis are samples dated from 6/00 to 12/00

Third priority for analysis are samples dated from 1/00 to 5/15/00

[illegible]

COC Tape was present on outer package	Y	N
---------------------------------------	---	---

COC Tape was unbroken on outer package	Y	N
--	---	---

COC Tape was present on sample	Y	N
--------------------------------	---	---

COC Tape was unbroken on sample Y N

Received in good condition Y N

Labels Indicate Properly Preserved	Y	N
------------------------------------	---	---

Received within Holding Time Y N

Temp of Cooler when Received, C°

1	2	3	4
---	---	---	---

Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time

COC ID 2549

Chain of Custody Record



Client EPA
Site Name Housatonic River Project
W.O. _____
Laboratory GERG

Contact Name	Kelly Spittler
Contact Phone No.	610-701-3953
Turn-around-Time	
Sampler	Woodlot Alt

Analysis Requested by Group by Container

(number listed for total containers per analysis group)

Preservative

[illegible]

COC ID 2550

Chain of Custody Record



Client EPA
 Site Name Housatonic River Project
 W.O. _____
 Laboratory GERG

Contact Name Kelly Spittler
 Contact Phone No. 610-701-3953
 Turn-around-Time _____
 Sampler Woodlot Alt

Analysis Requested by Group by Container

(number listed for total containers per analysis group)

Preservative

Lab Batch Number

Lab ID	Sample ID	Matrix QC		Total Num of Containers	Matrix	Date Collected	Duplicate Sample	App IX VOA	Atrocials	Homologs	Congeners	PCB	Herbicide	Dioxin/Furan	Appx. IX Metals	CN	Sulfide	TOC	Grain Size	PAH	OC Pesticides				
		MS	MSD																						
10.255g	H3TO10RP37-0-F005	x	x	1	TI	10-May-00					X	X		X	X					X	X				
43.36g	H3TO04RP32-0-F003			1	TI	1-May-00						X													
14.747g	H3TO04RP32-0-F006			1	TI	1-May-00	x				X	X		X	X					X	X				
70.57g	H3TO08RP34-0-F005			1	TI	3-Apr-00					X	X		X	X					X	X				
49.37g	H3TO08RP34-0-F006			1	TI	3-Apr-00						X													
60.24g	H3TO08RP35-0-F003			1	TI	2-May-00						X													
12.789g	H3TO10RP37-0-F009			1	TI	5-May-00					X	X		X	X					X	X				
76.56g	H3TO12RP39-0-F001			1	TI	3-May-00					X	X		X	X					X	X				
17.68g	H3TO12RP39-0-F008			1	TI	4-May-00						X													
	R1-F001(Offal)	x	x	1	TI	28-Apr-00						X													
	R1-F006(Offal)			1	TI	28-Apr-00					X	X		X	X					X	X				
	R2-F009(Offal)			1	TI	26-Apr-00					X	X		X	X					X	X				
	R2-F012(Offal)			1	TI	26-Apr-00						X													
	R3-F001(Offal)			1	TI	18-May-00						X													

Field Remarks/Comments

Experimental Adult Females without ovary, Rana pipiens
 Lab to create duplicate
 First priority for analysis are samples dated 5/18/00 to 5/30/00
 Second priority for analysis are samples dated from 6/00 to 12/00
 Third priority for analysis are samples dated from 1/00 to 5/15/00

Lab Use Only

COC Tape was present on outer package Y N

COC Tape was unbroken on outer package Y N

COC Tape was present on sample Y N

COC Tape was unbroken on sample Y N

Received in good condition Y N

Labels Indicate Properly Preserved Y N

Received within Holding Time Y N

Temp of Cooler when Received, C°

1	2	3	4
---	---	---	---

Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time

Client EPA
Site Name Housatonic River Project
W.O.
Laboratory GERG

Chain of Custody Record



(number listed for total containers per analysis group)

Lab Batch Number

[illegible]Experimental Adult Females, *Rana pipiens*

First priority for analysis are samples dated 5/18/00 to 5/30/00

Second priority for analysis are samples dated from 6/00 to 12/00

Third priority for analysis are samples dated from 1/00 to 5/15/00

COC Tape was present on outer package	Y	N
---------------------------------------	---	---

COC Tape was unbroken on outer package	Y	N
--	---	---

COC Tape was present on sample	Y	N
--------------------------------	---	---

COC Tape was unbroken on sample Y N

Received in good condition Y N

Labels Indicate Properly Preserved	Y	N
------------------------------------	---	---

Received within Holding Time Y N

Temp of Cooler when Received, C°			
1	2	3	4

Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time

COC ID 2551

Chain of Custody Record



Client EPA
Site Name Housatonic River Project
W.O.
Laboratory GERG

Contact Name	Kelly Spittler
Contact Phone No.	610-701-3953
Turn-around-Time	
Sampler	Woodlot Alt

Analysis Requested by Group by Container

(number listed for total containers per analysis group)

Preservative

Lab Batch Number

[illegible]

Field Remarks/Comments	
------------------------	--

Adult Chemical Analysis, *Rana pipiens*

First priority for analysis are samples dated 5/18/00 to 5/30/00

Second priority for analysis are samples dated from 6/00 to 12/00

Third priority for analysis are samples dated from 1/00 to 5/15/00

Lab to create duplicate

[illegible]

COC Tape was present on outer package	Y	N
---------------------------------------	---	---

COC Tape was unbroken on outer package	Y	N
--	---	---

COC Tape was present on sample	Y	N
--------------------------------	---	---

COC Tape was unbroken on sample Y N

Received in good condition Y N

Labels Indicate Properly Preserved	Y	N
------------------------------------	---	---

Received within Holding Time Y N

Temp of Cooler when Received, C°

1	2	3	4
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Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time

Appendix C

Tissue Samples For Organic and Metals (COC) Analyses

Exposure Assessment total PCBs

total PCB Analytical Results For Water & Sediment Samples

Organic & Metals Analytical Results (COCs) For Tissue Samples

Appendix C

HOUSATONIC RIVER PROJECT
***Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000**
TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Leopard Frog Egg Mass Samples

TA -> TV to uniquely represent ovary of adult LF

[Freezer] Location	Sample ID	Site	Date collected	Description:	Study	Total PCBs ¹	PCB Congeners ¹	Dioxin/ Furans ¹	Metals ¹	PAH/OC Pesticides ¹	New ID
Bag 1	H3TA03RP31-0-F002	31	2000	Ovary	2000 Leopard Frog Study						not analyzed - unable to tell if sample included ovaries (were not frozen separately)
Bag 4	H3TA04RP32-0-F001	32	2000	Ovary	2000 Leopard Frog Study						
Bag 2	H3TA04RP32-0-F003	32	2000	Ovary	2000 Leopard Frog Study	Y					H3TV04RP32-0-F003
Bag 2	H3TA04RP32-0-F006	32	2000	Ovary	2000 Leopard Frog Study	Y					H3TV04RP32-0-F006
Bag 4	H3TA04RP32-0-F007	32	2000	Ovary	2000 Leopard Frog Study						
Bag 5	H3TA04RP33-0-F002	33	2000	Ovary	2000 Leopard Frog Study						
Bag 5	H3TA04RP33-0-F004	33	2000	Ovary	2000 Leopard Frog Study						
Bag 5	H3TA04RP33-0-F005	33	2000	Ovary	2000 Leopard Frog Study						
Bag 6	H3TA04RP33-0-F006	33	2000	Ovary	2000 Leopard Frog Study						
Bag 6	H3TA04RP33-0-F008	33	2000	Ovary	2000 Leopard Frog Study						
Bag 8	H3TA08RP34-0-F001	34	2000	Egg Mass (ovary)	2000 Leopard Frog Study						
Bag 8	H3TA08RP34-0-F002	34	2000	Egg Mass (ovary)	2000 Leopard Frog Study						
Bag 8	H3TA08RP34-0-F003	34	2000	Egg Mass (ovary)	2000 Leopard Frog Study						
Bag 9	H3TA08RP34-0-F005	34	2000	Egg Mass (ovary)	2000 Leopard Frog Study	Y					H3TV08RP34-0-F005
Bag 9	H3TA08RP34-0-F006	34	2000	Egg Mass (ovary)	2000 Leopard Frog Study	Y					H3TV08RP34-0-F006
Bag 10	H3TA08RP35-0-F001	35	2000	Ovary	2000 Leopard Frog Study						
Bag 10	H3TA08RP35-0-F002	35	2000	Ovary	2000 Leopard Frog Study						
Bag 10	H3TA08RP35-0-F003	35	2000	Ovary	2000 Leopard Frog Study	Y					H3TV08RP35-0-F003
Bag 11	H3TA08RP35-0-F004	35	2000	Ovary	2000 Leopard Frog Study						
Bag 11	H3TA08RP35-0-F005	35	2000	Ovary	2000 Leopard Frog Study						
Bag 13	H3TA10RP36-0-F001	36	2000	Ovary	2000 Leopard Frog Study						
Bag 17	H3TA10RP37-0-F001	37	2000	Ovary	2000 Leopard Frog Study						
Bag 17	H3TA10RP37-0-F002	37	2000	Ovary	2000 Leopard Frog Study						
Bag 15	H3TA10RP37-0-F003	37	2000	Ovary	2000 Leopard Frog Study						
Bag 15	H3TA10RP37-0-F004	37	2000	Ovary	2000 Leopard Frog Study						
Bag 15	H3TA10RP37-0-F005	37	2000	Ovary	2000 Leopard Frog Study	Y					H3TV10RP37-0-F005
Bag 15	H3TA10RP37-0-F009	37	2000	Ovary	2000 Leopard Frog Study	Y					H3TV10RP37-0-F009

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

Appendix C

HOUSATONIC RIVER PROJECT
***Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000**
TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Leopard Frog Egg Mass Samples

TA -> TV to uniquely represent ovary of adult LF

[Freezer] Location	Sample ID	Site	Date collected	Description:	Study	Total PCBs ¹	PCB Congeners ¹	Dioxin/ Furans ¹	Metals ¹	PAH/OC Pesticides ¹	New ID
Bag 19	H3TA12RP38-0-F001	38	2000	Ovary	2000 Leopard Frog Study						
Bag 19	H3TA12RP38-0-F002	38	2000	Ovary	2000 Leopard Frog Study						
Bag 19	H3TA12RP38-0-F004	38	2000	Ovary	2000 Leopard Frog Study						
Bag 19	H3TA12RP38-0-F007	38	2000	Ovary	2000 Leopard Frog Study						
Bag 22	H3TA12RP39-0-F001	39	2000	Ovary	2000 Leopard Frog Study	Y					H3TV12RP39-0-F001
Bag 22	H3TA12RP39-0-F002	39	2000	Ovary	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F006	39	2000	Ovary	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F007	39	2000	Ovary	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F008	39	2000	Ovary	2000 Leopard Frog Study	Y					H3TV12RP39-0-F008
Bag 23	H3TA12RP39-0-F009	39	2000	Ovary	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F010	39	2000	Ovary	2000 Leopard Frog Study						
Bag 26	R1-F001	R1	2000	Ovary	2000 Leopard Frog Study	Y					R1-F001(Ovary)
Bag 26	R1-F001	R1	2000	Ovary	2000 Leopard Frog Study						
Bag 26	R1-F001	R1	2000	Ovary	2000 Leopard Frog Study						
Bag 26	R1-F003	R1	2000	Ovary	2000 Leopard Frog Study						
Bag 27	R1-F005	R1	2000	Ovary	2000 Leopard Frog Study						
Bag 27	R1-F005	R1	2000	Ovary	2000 Leopard Frog Study						
Bag 27	R1-F005	R1	2000	Ovary	2000 Leopard Frog Study						
Bag 27	R1-F006	R1	2000	Ovary	2000 Leopard Frog Study	Y					R1-F006(Ovary)
Bag 30	R2-F009	R2	2000	Ovary	2000 Leopard Frog Study	Y					R2-F009(Ovary)
Bag 30	R2-F010	R2	2000	Ovary	2000 Leopard Frog Study						
Bag 28	R2-F011	R2	2000	Ovary	2000 Leopard Frog Study						
Bag 28	R2-F011	R2	2000	Ovary	2000 Leopard Frog Study						
Bag 28	R2-F012	R2	2000	Ovary	2000 Leopard Frog Study						
Bag 28	R2-F012	R2	2000	Ovary	2000 Leopard Frog Study	Y					R2-F012(Ovary)
Bag 31	R3-F001	R3	2000	Ovary	2000 Leopard Frog Study	Y					R3-F001(Ovary)
Bag 31	R3-F002	R3	2000	Ovary	2000 Leopard Frog Study	Y					R3-F002(Ovary)
Bag 31	R3-F002	R3	2000	Ovary	2000 Leopard Frog Study						
Bag 31	R3-F003	R3	2000	Ovary	2000 Leopard Frog Study	Y					R3-F003(Ovary)
Bag 33	R3-F005	R3	2000	Ovary	2000 Leopard Frog Study						
Bag 33	R3-F006	R3	2000	Ovary	2000 Leopard Frog Study						
Bag 33	R3-F006	R3	2000	Ovary	2000 Leopard Frog Study						

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

Appendix C

HOUSATONIC RIVER PROJECT *Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000 TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Leopard Frog Larvae to Metamorph Samples

[Freezer] Location	Site	Sample ID	Description:	Date collected	Study	Total PCBs ¹	
Bag 35	33	H3TA04RP33-0-EM01	Dead Larvae	2000	2000 Leopard Frog Study		Not analyzed - only *one* larvae in jar
Bag 36	34	H3TA08RP34-0-EM01	Hatched Embryos 4/18	2000	2000 Leopard Frog Study		
Bag 36	34	H3TA08RP34-0-EM01	Hatched Embryos 5/22	2000	2000 Leopard Frog Study	Y	
Bag 37	35	H3TA08RP35-0-TP01	Tadpoles 5/8	2000	2000 Leopard Frog Study	Y	
Bag 38	36	H3TA10RP36-0-EM01	Hatched Larvae	2000	2000 Leopard Frog Study		
Bag 38	36	H3TA10RP36-0-EM01	Metamorph (T4 Exposed)	2000	2000 Leopard Frog Study		
Bag 38	36	H3TA10RP36-0-EM01	Tadpoles	2000	2000 Leopard Frog Study		
Bag 38	36	H3TA10RP36-0-EM01	Tadpoles (T4 Exposed)	2000	2000 Leopard Frog Study		
Bag 38	36	H3TA10RP36-0-EM02	Hatched Embryos	2000	2000 Leopard Frog Study		
Bag 38	36	H3TA10RP36-0-EM02	Tadpoles 4/13	2000	2000 Leopard Frog Study	Y	
Bag 39	37	H3TA10RP37-0-TP01	Tadpoles	2000	2000 Leopard Frog Study	Y	
Bag 39	37	H3TA10RP37-0-TP01	T1Tadpoles 5/9/00	2000	2000 Leopard Frog Study		
Bag 40	39	H3TA12RP39-0-EM01	Hatched Embryos	2000	2000 Leopard Frog Study		
Bag 40	39	H3TA12RP39-0-EM01	Tadpoles 5/23	2000	2000 Leopard Frog Study	Y	

2000

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

Appendix C

HOUSATONIC RIVER PROJECT
***Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000**
TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Leopard Frog Adult "Experimental" Samples

TA -> TO to uniquely represent offal portion of adult LF

[Freezer] Location	Sample ID	Site	Date collected	Description:	Study	Total PCBs ¹	PCB Congeners ¹	Dioxin/ Furans ¹	Metals ¹	PAH/OC Pesticides ¹	New ID
Bag 1	H3TA03RP31-0-F002	31	2000	Body,Liver	2000 Leopard Frog Study		not analyzed - ovaries were not frozen separately, unable to tell if body and ovaries separate in sample jar				
Bag 4	H3TA04RP32-0-F001	32	2000	Body,Liver	2000 Leopard Frog Study						
Bag 2	H3TA04RP32-0-F003	32	2000	Body,Liver	2000 Leopard Frog Study	Y					H3TO04RP32-0-F003
Bag 2	H3TA04RP32-0-F006	32	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	H3TO04RP32-0-F006
Bag 4	H3TA04RP32-0-F007	32	2000	Body,Liver	2000 Leopard Frog Study						
Bag 5	H3TA04RP33-0-F002	33	2000	Body,Liver	2000 Leopard Frog Study						
Bag 5	H3TA04RP33-0-F004	33	2000	Body,Liver	2000 Leopard Frog Study						
Bag 5	H3TA04RP33-0-F005	33	2000	Body,Liver	2000 Leopard Frog Study						
Bag 6	H3TA04RP33-0-F006	33	2000	Body,Liver	2000 Leopard Frog Study						
Bag 6	H3TA04RP33-0-F008	33	2000	Body,Liver	2000 Leopard Frog Study						
Bag 8	H3TA08RP34-0-F001	34	2000	Body,Liver	2000 Leopard Frog Study						
Bag 8	H3TA08RP34-0-F002	34	2000	Body,Liver	2000 Leopard Frog Study						
Bag 8	H3TA08RP34-0-F003	34	2000	Body,Liver	2000 Leopard Frog Study						
Bag 9	H3TA08RP34-0-F005	34	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	H3TO08RP34-0-F005
Bag 9	H3TA08RP34-0-F006	34	2000	Body,Liver	2000 Leopard Frog Study	Y					H3TO08RP34-0-F006
Bag 10	H3TA08RP35-0-F001	35	2000	Body,Liver	2000 Leopard Frog Study						
Bag 10	H3TA08RP35-0-F002	35	2000	Body,Liver	2000 Leopard Frog Study						
Bag 10	H3TA08RP35-0-F003	35	2000	Body,Liver	2000 Leopard Frog Study	Y					H3TO08RP35-0-F003
Bag 11	H3TA08RP35-0-F004	35	2000	Body,Liver	2000 Leopard Frog Study						
Bag 11	H3TA08RP35-0-F005	35	2000	Body,Liver	2000 Leopard Frog Study						
Bag 13	H3TA10RP36-0-F001	36	2000	Body,Liver	2000 Leopard Frog Study						
Bag 13	H3TA10RP36-0-F002	36	2000	Body,Liver	2000 Leopard Frog Study						
Bag 17	H3TA10RP37-0-F001	37	2000	Body,Liver	2000 Leopard Frog Study						
Bag 17	H3TA10RP37-0-F002	37	2000	Body,Liver	2000 Leopard Frog Study						
Bag 15	H3TA10RP37-0-F003	37	2000	Body,Liver	2000 Leopard Frog Study						
Bag 15	H3TA10RP37-0-F004	37	2000	Body,Liver	2000 Leopard Frog Study						
Bag 15	H3TA10RP37-0-F005	37	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	H3TO10RP37-0-F005
Bag 15	H3TA10RP37-0-F009	37	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	H3TO10RP37-0-F009
Bag 19	H3TA12RP38-0-F001	38	2000	Body,Liver	2000 Leopard Frog Study						
Bag 19	H3TA12RP38-0-F002	38	2000	Body,Liver	2000 Leopard Frog Study						
Bag 19	H3TA12RP38-0-F004	38	2000	Body,Liver	2000 Leopard Frog Study						
Bag 19	H3TA12RP38-0-F007	38	2000	Body,Liver	2000 Leopard Frog Study						

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

Appendix C

HOUSATONIC RIVER PROJECT
***Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000**
TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Leopard Frog Adult "Experimental" Samples

TA -> TO to uniquely represent offal portion of adult LF

[Freezer] Location	Sample ID	Site	Date collected	Description:	Study	Total PCBs ¹	PCB Congeners ¹	Dioxin/ Furans ¹	Metals ¹	PAH/OC Pesticides ¹	New ID
Bag 22	H3TA12RP39-0-F001	39	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	H3TO12RP39-0-F001
Bag 22	H3TA12RP39-0-F002	39	2000	Body,Liver	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F006	39	2000	Body,Liver	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F007	39	2000	Body,Liver	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F008	39	2000	Body,Liver	2000 Leopard Frog Study	Y					
Bag 23	H3TA12RP39-0-F009	39	2000	Body,Liver	2000 Leopard Frog Study						H3TO12RP39-0-F008
Bag 23	H3TA12RP39-0-F010	39	2000	Body,Liver	2000 Leopard Frog Study						
Bag 26	R1-F001	R1	2000	Body,Liver	2000 Leopard Frog Study	Y					
Bag 26	R1-F003	R1	2000	Body,Liver	2000 Leopard Frog Study						
Bag 27	R1-F005	R1	2000	Body,Liver	2000 Leopard Frog Study						
Bag 27	R1-F006	R1	2000	Body,Liver,Ovary	2000 Leopard Frog Study	Y	Y	Y	Y	Y	R1-F006(Offal)
Bag 30	R2-F009	R2	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	R2-F009(Offal)
Bag 30	R2-F010	R2	2000	Body,Liver	2000 Leopard Frog Study						
Bag 28	R2-F011	R2	2000	Body,Liver	2000 Leopard Frog Study						
Bag 28	R2-F012	R2	2000	Body,Liver	2000 Leopard Frog Study	Y					
Bag 31	R3-F001	R3	2000	Body,Liver	2000 Leopard Frog Study	Y					
Bag 31	R3-F002	R3	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	R3-F001(Offal)
Bag 31	R3-F003	R3	2000	Body,Liver	2000 Leopard Frog Study	Y					R3-F002(Offal)
Bag 33	R3-F005	R3	2000	Body,Liver	2000 Leopard Frog Study						R3-F003(Offal)
Bag 33	R3-F006	R3	2000	Body,Liver	2000 Leopard Frog Study						

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

Appendix C

HOUSATONIC RIVER PROJECT *Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000 TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Adult Leopard Frog Samples for Chemical Analysis

[Freezer] Location	Sample ID	Site	Date collected	Description:	Study	Total PCBs ¹	Composite ID
Bag 1	H3TA03RP31-0-F001	31	2000	Analytical	2000 Leopard Frog Study	Y	H3TA03RP31-0-C001
Bag 2	H3TA04RP32-0-F002	32	2000	Analytical	2000 Leopard Frog Study	Y	H3TA04RP32-0-C001
Bag 2	H3TA04RP32-0-F005	32	2000	Analytical	2000 Leopard Frog Study		
Bag 4	H3TA04RP32-0-M005	32	2000	Analytical	2000 Leopard Frog Study		
Bag 4	H3TA04RP32-0-M006	32	2000	Analytical	2000 Leopard Frog Study		
Bag 5	H3TA04RP33-0-F003	33	2000	Analytical	2000 Leopard Frog Study	Y	H3TA04RP33-0-C001
Bag 5	H3TA04RP33-0-F007	33	2000	Analytical	2000 Leopard Frog Study		
Bag 6	H3TA04RP33-0-M003	33	2000	Analytical	2000 Leopard Frog Study		
Bag 6	H3TA04RP33-0-M004	33	2000	Analytical	2000 Leopard Frog Study		
Bag 8	H3TA08RP34-0-F004	34	2000	Analytical	2000 Leopard Frog Study	Y	H3TA08RP34-0-C001
Bag 8	H3TA08RP34-0-F007	34	2000	Analytical	2000 Leopard Frog Study		
Bag 10	H3TA08RP35-0-F006	35	2000	Analytical	2000 Leopard Frog Study	Y	H3TA08RP35-0-C001
Bag 10	H3TA08RP35-0-F007	35	2000	Analytical	2000 Leopard Frog Study		
Bag 11	H3TA08RP35-0-M005	35	2000	Analytical	2000 Leopard Frog Study		
Bag 11	H3TA08RP35-0-M006	35	2000	Analytical	2000 Leopard Frog Study		
Bag 13	H3TA10RP36-0-F003	36	2000	Analytical	2000 Leopard Frog Study	Y	H3TA10RP36-0-C001
Bag 13	H3TA10RP36-0-F005	36	2000	Analytical	2000 Leopard Frog Study		
Bag 13	H3TA10RP36-0-M002	36	2000	Analytical	2000 Leopard Frog Study		
Bag 17	H3TA10RP37-0-F007	37	2000	Analytical	2000 Leopard Frog Study	Y	H3TA10RP37-0-C001
Bag 17	H3TA10RP37-0-F008	37	2000	Analytical	2000 Leopard Frog Study		
Bag 16	H3TA10RP37-0-M004	37	2000	Analytical	2000 Leopard Frog Study		
Bag18	H3TA10RP37-0-M006	37	2000	Analytical	2000 Leopard Frog Study		
Bag 19	H3TA12RP38-0-F003	38	2000	Analytical	2000 Leopard Frog Study	Y	H3TA12RP38-0-C001
Bag 19	H3TA12RP38-0-F005	38	2000	Analytical	2000 Leopard Frog Study		
Bag 21	H3TA12RP38-0-M005	38	2000	Analytical	2000 Leopard Frog Study		
Bag 21	H3TA12RP38-0-M006	38	2000	Analytical	2000 Leopard Frog Study		
Bag 22	H3TA12RP39-0-F003	39	2000	Analytical	2000 Leopard Frog Study	Y	H3TA12RP39-0-C001

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

Appendix C

HOUSATONIC RIVER PROJECT *Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000 TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Adult Leopard Frog Samples for Chemical Analysis

[Freezer] Location	Sample ID	Site	Date collected	Description:	Study	Total PCBs ¹	Composite ID
Bag 22	H3TA12RP39-0-F004	39	2000	Analytical	2000 Leopard Frog Study		
Bag 22	H3TA12RP39-0-F005	39	2000	Analytical	2000 Leopard Frog Study		
Bag 24	H3TA12RP39-0-M001	39	2000	Analytical	2000 Leopard Frog Study		
Bag 24	H3TA12RP39-0-M005	39	2000	Analytical	2000 Leopard Frog Study		
Bag 24	H3TA12RP39-0-M007	39	2000	Analytical	2000 Leopard Frog Study		
Bag 26	R1-F002	R1	2000	Analytical	2000 Leopard Frog Study	Y	R1-C001
Bag 27	R1-F004	R1	2000	Analytical	2000 Leopard Frog Study		
Bag 25	R1-M002	R1	2000	Analytical	2000 Leopard Frog Study		
Bag 25	R1-M003	R1	2000	Analytical	2000 Leopard Frog Study		
Bag 30	R2-F007	R2	2000	Analytical	2000 Leopard Frog Study	Y	R2-C001
Bag 30	R2-F008	R2	2000	Analytical	2000 Leopard Frog Study		
Bag 29	R2-M007	R2	2000	Analytical	2000 Leopard Frog Study		
Bag 29	R2-M008	R2	2000	Analytical	2000 Leopard Frog Study		
Bag 33	R3-F004	R3	2000	Analytical	2000 Leopard Frog Study	Y	R3-C001
Bag32	R3-M004	R3	2000	Analytical	2000 Leopard Frog Study		

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

HOUSATONIC RIVER PROJECT
***Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000**
TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Leopard Frog Crossover Larvae Samples

FEL Lab	RP	Weston	FEL Lab	Sample	Total	new
Location	Site	Sample I.D. No.	No.	Description	PCBs¹	ID
Bag 41	R1		R1-F001	Hatched Embryos	Y	R1-F001-00-C1
	R1		R1-F001	Hatched Embryos	Y	R1-F001-00-C2
	R1	Crossover Study	R1-F001	Hatched Embryos Raised in Site 33 Water	Y	R1-F001-33-E1
Bag 42	R4	Spike Study	R4-Egg Mass	FETAX Water/Sand Exposed	Y	R4-EM01-00-C1
	R4	Spike Study	R4-Egg Mass	Site 40 Water/Sediment Exposed	Y	R4-EM01-40-E1
	R4	Spike Study	R4-Egg Mass	Site 40 Water/Sed. Spiked w/ 30 mg/kg Aro 1260	Y	R4-EM01-40-S1

2000

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

Exposure Assessment total PCBs

HOUSATONIC RIVER PROJECT
***RANA pipiens* 2000 STUDY**
EXPOSURE ASSESSMENT FOR WATER PCB VALUES¹

2000 LEOPARD FROG REPRODUCTION STUDY		
Vernal pool ID	Water sample ID	Total PCB (µg/L)
E-5	H3-SW000027-0-0M30	0.043
W-9a	H3-SW000030-0-0M30	0.013
W-8	H3-SW000029-0-0M30	0.14
DUP.	H3-SW000029-1-0M30	0.036
W-7a	H3-SW000028-0-0M30	0.03
W-6	H3-SW000032-0-0M30	0.22
W-4	H3-SW000031-0-0M30	0.013
EW-3	H3-SW000034-0-0M30	0.41
E-1	H3-SW000035-0-0M30	0.24
W-1	H3-SW000033-0-0M30	0.013
MP REF.	H9-SW000049-0-0Y24	0.013

¹Based on work done by EVS Environment Consultants.

**HOUSATONIC RIVER PROJECT
RANA pipiens 2000 STUDY
 EXPOSURE ASSESSMENT FOR SEDIMENT PCB VALUES¹**

2000 LEOPARD FROG REPRODUCTION STUDY		
Vernal pool ID	Sediment sample ID	Total PCB (mg/kg)
E-5	H3-SE001246-0-0000	37.0
W-9a	H3-SE001249-0-0000	4.3
W-8	H3-SE001248-0-0000	120.0
W-7a	H3-SE001247-0-0000	18.0
W-6	H3-SE001251-0-0000	42.0
W-4	H3-SE001250-0-0000	0.46
EW-3	H3-SE001253-0-0000	30.0
E-1	H3-SE001245-0-0000	160.0
W-1	H3-SE001252-0-0000	0.15
MP REF.	H9-SE001279-0-0000	0.04

¹Based on work done by EVS Environment Consultants.

total PCB Analytical Results for Water and Sediment Samples

Appendix C

Rana pipiens Developmental Study 2000 PCB Test Results Water Samples

Site ID					
Location ID	SW000027	SW000028	SW000029	SW000029	SW000030
Field Sample ID	H3-SW000027-0-0M30	H3-SW000028-0-0M30	H3-SW000029-0-0M30	H3-SW000029-1-0M30	H3-SW000030-0-0M30
Date Collected	03/30/2000	03/30/2000	03/30/2000	03/30/2000	03/30/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA_COE	EPA_COE	EPA_COE	EPA_COE	EPA_COE
Analyte					
PCBS					
AROCLOR-1016 (ug/l)	0.013 UJ	0.013 UJ	0.026 U	0.013 UJ	0.013 R
AROCLOR-1221 (ug/l)	0.013 UJ	0.013 UJ	0.026 U	0.013 UJ	0.013 R
AROCLOR-1232 (ug/l)	0.013 UJ	0.013 UJ	0.026 U	0.013 UJ	0.013 R
AROCLOR-1242 (ug/l)	0.013 UJ	0.013 UJ	0.026 U	0.013 UJ	0.013 R
AROCLOR-1248 (ug/l)	0.013 UJ	0.013 UJ	0.026 U	0.013 UJ	0.013 R
AROCLOR-1254 (ug/l)	0.015 J	0.013 UJ	0.029	0.016 J	0.013 R
AROCLOR-1260 (ug/l)	0.028 J	0.030 J	0.11 J	0.020 J	0.013 R
PCB, TOTAL (ug/l)	0.043 J	0.030 J	0.14 J	0.036 J	0.0013 R

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

Rana pipiens Developmental Study 2000 PCB Test Results Water Samples

Site ID					
Location ID	SW000031	SW000032	SW000033	SW000034	SW000035
Field Sample ID	H3-SW000031-0-0M30	H3-SW000032-0-0M30	H3-SW000033-0-0M30	H3-SW000034-0-0M30	H3-SW000035-0-0M30
Date Collected	03/30/2000	03/30/2000	03/30/2000	03/30/2000	03/30/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA_COE	EPA_COE	EPA_COE	EPA_COE	EPA_COE
Analyte					
PCBS					
AROCLOR-1016 (ug/l)	0.013 U	0.026 U	0.013 UJ	0.051 U	0.025 U
AROCLOR-1221 (ug/l)	0.013 U	0.026 U	0.013 UJ	0.051 U	0.025 U
AROCLOR-1232 (ug/l)	0.013 U	0.026 U	0.013 UJ	0.051 U	0.025 U
AROCLOR-1242 (ug/l)	0.013 U	0.026 U	0.013 UJ	0.051 U	0.025 U
AROCLOR-1248 (ug/l)	0.013 U	0.026 U	0.013 UJ	0.051 U	0.025 U
AROCLOR-1254 (ug/l)	0.013 U	0.044	0.013 UJ	0.067	0.048
AROCLOR-1260 (ug/l)	0.013 UJ	0.18 J	0.013 UJ	0.34 J	0.19 J
PCB, TOTAL (ug/l)	0.0013 UJ	0.22 J	0.0013 UJ	0.41 J	0.24 J

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

Rana pipiens Developmental Study 2000 PCB Test Results Sediment Samples

Site ID					
Location ID	SE001245	SE001246	SE001247	SE001248	SE001248
Field Sample ID	H3-SE001245-0-0000	H3-SE001246-0-0000	H3-SE001247-0-0000	H3-SE001248-0-0000	H3-SE001248-1-0000
Date Collected	03/30/2000	03/30/2000	03/30/2000	03/30/2000	03/30/2000
Depth	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Source	EPA_COE	EPA_COE	EPA_COE	EPA_COE	EPA_COE
Analyte					
PCBS					
AROCLOR-1016 (ug/kg)	12000 R	3800 U	1800 U	9800 U	13000 U
AROCLOR-1221 (ug/kg)	12000 R	3800 U	1800 U	9800 U	13000 U
AROCLOR-1232 (ug/kg)	12000 R	3800 U	1800 U	9800 U	13000 U
AROCLOR-1242 (ug/kg)	12000 R	3800 U	1800 U	9800 U	13000 U
AROCLOR-1248 (ug/kg)	12000 R	3800 U	1800 U	9800 U	13000 U
AROCLOR-1254 (ug/kg)	25000 J	7900	2300	18000	22000
AROCLOR-1260 (ug/kg)	130000 J	29000	16000	100000	100000
PCB, TOTAL (ug/kg)	160000 J	37000	18000	120000	120000

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

Rana pipiens Developmental Study 2000 PCB Test Results Sediment Samples

Site ID					
Location ID	SE001249	SE001250	SE001251	SE001252	SE001253
Field Sample ID	H3-SE001249-0-0000	H3-SE001250-0-0000	H3-SE001251-0-0000	H3-SE001252-0-0000	H3-SE001253-0-0000
Date Collected	03/30/2000	03/30/2000	03/30/2000	03/30/2000	03/30/2000
Depth	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Source	EPA_COE	EPA_COE	EPA_COE	EPA_COE	EPA_COE
Analyte					
PCBS					
AROCLOR-1016 (ug/kg)	540 U	79.0 U	3900 U	88.0 R	4100 U
AROCLOR-1221 (ug/kg)	540 U	79.0 U	3900 U	88.0 R	4100 U
AROCLOR-1232 (ug/kg)	540 U	79.0 U	3900 U	88.0 R	4100 U
AROCLOR-1242 (ug/kg)	540 U	79.0 U	3900 U	88.0 R	4100 U
AROCLOR-1248 (ug/kg)	540 U	79.0 U	3900 U	88.0 R	4100 U
AROCLOR-1254 (ug/kg)	1100 J	79.0 U	7200	150 J	5100
AROCLOR-1260 (ug/kg)	3200	460	35000	88.0 R	25000
PCB, TOTAL (ug/kg)	4300 J	460	42000	150 J	30000

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

Rana pipiens Developmental Study 2000 PCB Test Results Sediment Samples

Site ID	
Location ID	SE001279
Field Sample ID	H9-SE001279-0-0000
Date Collected	05/24/2000
Depth	0.0-0.2
Source	EPA_COE
Analyte	
PCBS	
AROCLOR-1016 (ug/kg)	39.0 U
AROCLOR-1221 (ug/kg)	39.0 U
AROCLOR-1232 (ug/kg)	39.0 U
AROCLOR-1242 (ug/kg)	39.0 U
AROCLOR-1248 (ug/kg)	39.0 U
AROCLOR-1254 (ug/kg)	40.0
AROCLOR-1260 (ug/kg)	39.0 U
PCB, TOTAL (ug/kg)	40.0

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

Tissue Samples For Organic and Metals (COC) Analyses

Exposure Assessment total PCBs

total PCB Analytical Results For Water & Sediment Samples

Organic & Metals Analytical Results (COCs) For Tissue Samples

Appendix C

HOUSATONIC RIVER PROJECT
***Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000**
TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Leopard Frog Egg Mass Samples

TA -> TV to uniquely represent ovary of adult LF

[Freezer] Location	Sample ID	Site	Date collected	Description:	Study	Total PCBs ¹	PCB Congeners ¹	Dioxin/ Furans ¹	Metals ¹	PAH/OC Pesticides ¹	New ID
Bag 1	H3TA03RP31-0-F002	31	2000	Ovary	2000 Leopard Frog Study						not analyzed - unable to tell if sample included ovaries (were not frozen separately)
Bag 4	H3TA04RP32-0-F001	32	2000	Ovary	2000 Leopard Frog Study						
Bag 2	H3TA04RP32-0-F003	32	2000	Ovary	2000 Leopard Frog Study	Y					H3TV04RP32-0-F003
Bag 2	H3TA04RP32-0-F006	32	2000	Ovary	2000 Leopard Frog Study	Y					H3TV04RP32-0-F006
Bag 4	H3TA04RP32-0-F007	32	2000	Ovary	2000 Leopard Frog Study						
Bag 5	H3TA04RP33-0-F002	33	2000	Ovary	2000 Leopard Frog Study						
Bag 5	H3TA04RP33-0-F004	33	2000	Ovary	2000 Leopard Frog Study						
Bag 5	H3TA04RP33-0-F005	33	2000	Ovary	2000 Leopard Frog Study						
Bag 6	H3TA04RP33-0-F006	33	2000	Ovary	2000 Leopard Frog Study						
Bag 6	H3TA04RP33-0-F008	33	2000	Ovary	2000 Leopard Frog Study						
Bag 8	H3TA08RP34-0-F001	34	2000	Egg Mass (ovary)	2000 Leopard Frog Study						
Bag 8	H3TA08RP34-0-F002	34	2000	Egg Mass (ovary)	2000 Leopard Frog Study						
Bag 8	H3TA08RP34-0-F003	34	2000	Egg Mass (ovary)	2000 Leopard Frog Study						
Bag 9	H3TA08RP34-0-F005	34	2000	Egg Mass (ovary)	2000 Leopard Frog Study	Y					H3TV08RP34-0-F005
Bag 9	H3TA08RP34-0-F006	34	2000	Egg Mass (ovary)	2000 Leopard Frog Study	Y					H3TV08RP34-0-F006
Bag 10	H3TA08RP35-0-F001	35	2000	Ovary	2000 Leopard Frog Study						
Bag 10	H3TA08RP35-0-F002	35	2000	Ovary	2000 Leopard Frog Study						
Bag 10	H3TA08RP35-0-F003	35	2000	Ovary	2000 Leopard Frog Study	Y					H3TV08RP35-0-F003
Bag 11	H3TA08RP35-0-F004	35	2000	Ovary	2000 Leopard Frog Study						
Bag 11	H3TA08RP35-0-F005	35	2000	Ovary	2000 Leopard Frog Study						
Bag 13	H3TA10RP36-0-F001	36	2000	Ovary	2000 Leopard Frog Study						
Bag 17	H3TA10RP37-0-F001	37	2000	Ovary	2000 Leopard Frog Study						
Bag 17	H3TA10RP37-0-F002	37	2000	Ovary	2000 Leopard Frog Study						
Bag 15	H3TA10RP37-0-F003	37	2000	Ovary	2000 Leopard Frog Study						
Bag 15	H3TA10RP37-0-F004	37	2000	Ovary	2000 Leopard Frog Study						
Bag 15	H3TA10RP37-0-F005	37	2000	Ovary	2000 Leopard Frog Study	Y					H3TV10RP37-0-F005
Bag 15	H3TA10RP37-0-F009	37	2000	Ovary	2000 Leopard Frog Study	Y					H3TV10RP37-0-F009

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

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HOUSATONIC RIVER PROJECT
***Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000**
TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Leopard Frog Egg Mass Samples

TA -> TV to uniquely represent ovary of adult LF

[Freezer] Location	Sample ID	Site	Date collected	Description:	Study	Total PCBs ¹	PCB Congeners ¹	Dioxin/ Furans ¹	Metals ¹	PAH/OC Pesticides ¹	New ID
Bag 19	H3TA12RP38-0-F001	38	2000	Ovary	2000 Leopard Frog Study						
Bag 19	H3TA12RP38-0-F002	38	2000	Ovary	2000 Leopard Frog Study						
Bag 19	H3TA12RP38-0-F004	38	2000	Ovary	2000 Leopard Frog Study						
Bag 19	H3TA12RP38-0-F007	38	2000	Ovary	2000 Leopard Frog Study						
Bag 22	H3TA12RP39-0-F001	39	2000	Ovary	2000 Leopard Frog Study	Y					H3TV12RP39-0-F001
Bag 22	H3TA12RP39-0-F002	39	2000	Ovary	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F006	39	2000	Ovary	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F007	39	2000	Ovary	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F008	39	2000	Ovary	2000 Leopard Frog Study	Y					H3TV12RP39-0-F008
Bag 23	H3TA12RP39-0-F009	39	2000	Ovary	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F010	39	2000	Ovary	2000 Leopard Frog Study						
Bag 26	R1-F001	R1	2000	Ovary	2000 Leopard Frog Study	Y					R1-F001(Ovary)
Bag 26	R1-F001	R1	2000	Ovary	2000 Leopard Frog Study						
Bag 26	R1-F001	R1	2000	Ovary	2000 Leopard Frog Study						
Bag 26	R1-F003	R1	2000	Ovary	2000 Leopard Frog Study						
Bag 27	R1-F005	R1	2000	Ovary	2000 Leopard Frog Study						
Bag 27	R1-F005	R1	2000	Ovary	2000 Leopard Frog Study						
Bag 27	R1-F005	R1	2000	Ovary	2000 Leopard Frog Study						
Bag 27	R1-F006	R1	2000	Ovary	2000 Leopard Frog Study	Y					R1-F006(Ovary)
Bag 30	R2-F009	R2	2000	Ovary	2000 Leopard Frog Study	Y					R2-F009(Ovary)
Bag 30	R2-F010	R2	2000	Ovary	2000 Leopard Frog Study						
Bag 28	R2-F011	R2	2000	Ovary	2000 Leopard Frog Study						
Bag 28	R2-F011	R2	2000	Ovary	2000 Leopard Frog Study						
Bag 28	R2-F012	R2	2000	Ovary	2000 Leopard Frog Study						
Bag 28	R2-F012	R2	2000	Ovary	2000 Leopard Frog Study	Y					R2-F012(Ovary)
Bag 31	R3-F001	R3	2000	Ovary	2000 Leopard Frog Study	Y					R3-F001(Ovary)
Bag 31	R3-F002	R3	2000	Ovary	2000 Leopard Frog Study	Y					R3-F002(Ovary)
Bag 31	R3-F002	R3	2000	Ovary	2000 Leopard Frog Study						
Bag 31	R3-F003	R3	2000	Ovary	2000 Leopard Frog Study	Y					R3-F003(Ovary)
Bag 33	R3-F005	R3	2000	Ovary	2000 Leopard Frog Study						
Bag 33	R3-F006	R3	2000	Ovary	2000 Leopard Frog Study						
Bag 33	R3-F006	R3	2000	Ovary	2000 Leopard Frog Study						

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

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HOUSATONIC RIVER PROJECT *Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000 TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Leopard Frog Larvae to Metamorph Samples

[Freezer] Location	Site	Sample ID	Description:	Date collected	Study	Total PCBs ¹	
Bag 35	33	H3TA04RP33-0-EM01	Dead Larvae	2000	2000 Leopard Frog Study		Not analyzed - only *one* larvae in jar
Bag 36	34	H3TA08RP34-0-EM01	Hatched Embryos 4/18	2000	2000 Leopard Frog Study		
Bag 36	34	H3TA08RP34-0-EM01	Hatched Embryos 5/22	2000	2000 Leopard Frog Study	Y	
Bag 37	35	H3TA08RP35-0-TP01	Tadpoles 5/8	2000	2000 Leopard Frog Study	Y	
Bag 38	36	H3TA10RP36-0-EM01	Hatched Larvae	2000	2000 Leopard Frog Study		
Bag 38	36	H3TA10RP36-0-EM01	Metamorph (T4 Exposed)	2000	2000 Leopard Frog Study		
Bag 38	36	H3TA10RP36-0-EM01	Tadpoles	2000	2000 Leopard Frog Study		
Bag 38	36	H3TA10RP36-0-EM01	Tadpoles (T4 Exposed)	2000	2000 Leopard Frog Study		
Bag 38	36	H3TA10RP36-0-EM02	Hatched Embryos	2000	2000 Leopard Frog Study		
Bag 38	36	H3TA10RP36-0-EM02	Tadpoles 4/13	2000	2000 Leopard Frog Study	Y	
Bag 39	37	H3TA10RP37-0-TP01	Tadpoles	2000	2000 Leopard Frog Study	Y	
Bag 39	37	H3TA10RP37-0-TP01	T1Tadpoles 5/9/00	2000	2000 Leopard Frog Study		
Bag 40	39	H3TA12RP39-0-EM01	Hatched Embryos	2000	2000 Leopard Frog Study		
Bag 40	39	H3TA12RP39-0-EM01	Tadpoles 5/23	2000	2000 Leopard Frog Study	Y	

2000

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

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HOUSATONIC RIVER PROJECT
***Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000**
TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Leopard Frog Adult "Experimental" Samples

TA -> TO to uniquely represent offal portion of adult LF

[Freezer] Location	Sample ID	Site	Date collected	Description:	Study	Total PCBs ¹	PCB Congeners ¹	Dioxin/ Furans ¹	Metals ¹	PAH/OC Pesticides ¹	New ID
Bag 1	H3TA03RP31-0-F002	31	2000	Body,Liver	2000 Leopard Frog Study		not analyzed - ovaries were not frozen separately, unable to tell if body and ovaries separate in sample jar				
Bag 4	H3TA04RP32-0-F001	32	2000	Body,Liver	2000 Leopard Frog Study						
Bag 2	H3TA04RP32-0-F003	32	2000	Body,Liver	2000 Leopard Frog Study	Y					H3TO04RP32-0-F003
Bag 2	H3TA04RP32-0-F006	32	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	H3TO04RP32-0-F006
Bag 4	H3TA04RP32-0-F007	32	2000	Body,Liver	2000 Leopard Frog Study						
Bag 5	H3TA04RP33-0-F002	33	2000	Body,Liver	2000 Leopard Frog Study						
Bag 5	H3TA04RP33-0-F004	33	2000	Body,Liver	2000 Leopard Frog Study						
Bag 5	H3TA04RP33-0-F005	33	2000	Body,Liver	2000 Leopard Frog Study						
Bag 6	H3TA04RP33-0-F006	33	2000	Body,Liver	2000 Leopard Frog Study						
Bag 6	H3TA04RP33-0-F008	33	2000	Body,Liver	2000 Leopard Frog Study						
Bag 8	H3TA08RP34-0-F001	34	2000	Body,Liver	2000 Leopard Frog Study						
Bag 8	H3TA08RP34-0-F002	34	2000	Body,Liver	2000 Leopard Frog Study						
Bag 8	H3TA08RP34-0-F003	34	2000	Body,Liver	2000 Leopard Frog Study						
Bag 9	H3TA08RP34-0-F005	34	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	H3TO08RP34-0-F005
Bag 9	H3TA08RP34-0-F006	34	2000	Body,Liver	2000 Leopard Frog Study	Y					H3TO08RP34-0-F006
Bag 10	H3TA08RP35-0-F001	35	2000	Body,Liver	2000 Leopard Frog Study						
Bag 10	H3TA08RP35-0-F002	35	2000	Body,Liver	2000 Leopard Frog Study						
Bag 10	H3TA08RP35-0-F003	35	2000	Body,Liver	2000 Leopard Frog Study	Y					H3TO08RP35-0-F003
Bag 11	H3TA08RP35-0-F004	35	2000	Body,Liver	2000 Leopard Frog Study						
Bag 11	H3TA08RP35-0-F005	35	2000	Body,Liver	2000 Leopard Frog Study						
Bag 13	H3TA10RP36-0-F001	36	2000	Body,Liver	2000 Leopard Frog Study						
Bag 13	H3TA10RP36-0-F002	36	2000	Body,Liver	2000 Leopard Frog Study						
Bag 17	H3TA10RP37-0-F001	37	2000	Body,Liver	2000 Leopard Frog Study						
Bag 17	H3TA10RP37-0-F002	37	2000	Body,Liver	2000 Leopard Frog Study						
Bag 15	H3TA10RP37-0-F003	37	2000	Body,Liver	2000 Leopard Frog Study						
Bag 15	H3TA10RP37-0-F004	37	2000	Body,Liver	2000 Leopard Frog Study						
Bag 15	H3TA10RP37-0-F005	37	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	H3TO10RP37-0-F005
Bag 15	H3TA10RP37-0-F009	37	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	H3TO10RP37-0-F009
Bag 19	H3TA12RP38-0-F001	38	2000	Body,Liver	2000 Leopard Frog Study						
Bag 19	H3TA12RP38-0-F002	38	2000	Body,Liver	2000 Leopard Frog Study						
Bag 19	H3TA12RP38-0-F004	38	2000	Body,Liver	2000 Leopard Frog Study						
Bag 19	H3TA12RP38-0-F007	38	2000	Body,Liver	2000 Leopard Frog Study						

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

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HOUSATONIC RIVER PROJECT
***Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000**
TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Leopard Frog Adult "Experimental" Samples

TA -> TO to uniquely represent offal portion of adult LF

[Freezer] Location	Sample ID	Site	Date collected	Description:	Study	Total PCBs ¹	PCB Congeners ¹	Dioxin/ Furans ¹	Metals ¹	PAH/OC Pesticides ¹	New ID
Bag 22	H3TA12RP39-0-F001	39	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	H3TO12RP39-0-F001
Bag 22	H3TA12RP39-0-F002	39	2000	Body,Liver	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F006	39	2000	Body,Liver	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F007	39	2000	Body,Liver	2000 Leopard Frog Study						
Bag 23	H3TA12RP39-0-F008	39	2000	Body,Liver	2000 Leopard Frog Study	Y					
Bag 23	H3TA12RP39-0-F009	39	2000	Body,Liver	2000 Leopard Frog Study						H3TO12RP39-0-F008
Bag 23	H3TA12RP39-0-F010	39	2000	Body,Liver	2000 Leopard Frog Study						
Bag 26	R1-F001	R1	2000	Body,Liver	2000 Leopard Frog Study	Y					
Bag 26	R1-F003	R1	2000	Body,Liver	2000 Leopard Frog Study						
Bag 27	R1-F005	R1	2000	Body,Liver	2000 Leopard Frog Study						
Bag 27	R1-F006	R1	2000	Body,Liver,Ovary	2000 Leopard Frog Study	Y	Y	Y	Y	Y	R1-F006(Offal)
Bag 30	R2-F009	R2	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	R2-F009(Offal)
Bag 30	R2-F010	R2	2000	Body,Liver	2000 Leopard Frog Study						
Bag 28	R2-F011	R2	2000	Body,Liver	2000 Leopard Frog Study						
Bag 28	R2-F012	R2	2000	Body,Liver	2000 Leopard Frog Study	Y					
Bag 31	R3-F001	R3	2000	Body,Liver	2000 Leopard Frog Study	Y					
Bag 31	R3-F002	R3	2000	Body,Liver	2000 Leopard Frog Study	Y	Y	Y	Y	Y	R3-F001(Offal)
Bag 31	R3-F003	R3	2000	Body,Liver	2000 Leopard Frog Study	Y					R3-F002(Offal)
Bag 33	R3-F005	R3	2000	Body,Liver	2000 Leopard Frog Study						R3-F003(Offal)
Bag 33	R3-F006	R3	2000	Body,Liver	2000 Leopard Frog Study						

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

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HOUSATONIC RIVER PROJECT *Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000 TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Adult Leopard Frog Samples for Chemical Analysis

[Freezer] Location	Sample ID	Site	Date collected	Description:	Study	Total PCBs ¹	Composite ID
Bag 1	H3TA03RP31-0-F001	31	2000	Analytical	2000 Leopard Frog Study	Y	H3TA03RP31-0-C001
Bag 2	H3TA04RP32-0-F002	32	2000	Analytical	2000 Leopard Frog Study	Y	H3TA04RP32-0-C001
Bag 2	H3TA04RP32-0-F005	32	2000	Analytical	2000 Leopard Frog Study		
Bag 4	H3TA04RP32-0-M005	32	2000	Analytical	2000 Leopard Frog Study		
Bag 4	H3TA04RP32-0-M006	32	2000	Analytical	2000 Leopard Frog Study		
Bag 5	H3TA04RP33-0-F003	33	2000	Analytical	2000 Leopard Frog Study	Y	H3TA04RP33-0-C001
Bag 5	H3TA04RP33-0-F007	33	2000	Analytical	2000 Leopard Frog Study		
Bag 6	H3TA04RP33-0-M003	33	2000	Analytical	2000 Leopard Frog Study		
Bag 6	H3TA04RP33-0-M004	33	2000	Analytical	2000 Leopard Frog Study		
Bag 8	H3TA08RP34-0-F004	34	2000	Analytical	2000 Leopard Frog Study	Y	H3TA08RP34-0-C001
Bag 8	H3TA08RP34-0-F007	34	2000	Analytical	2000 Leopard Frog Study		
Bag 10	H3TA08RP35-0-F006	35	2000	Analytical	2000 Leopard Frog Study	Y	H3TA08RP35-0-C001
Bag 10	H3TA08RP35-0-F007	35	2000	Analytical	2000 Leopard Frog Study		
Bag 11	H3TA08RP35-0-M005	35	2000	Analytical	2000 Leopard Frog Study		
Bag 11	H3TA08RP35-0-M006	35	2000	Analytical	2000 Leopard Frog Study		
Bag 13	H3TA10RP36-0-F003	36	2000	Analytical	2000 Leopard Frog Study	Y	H3TA10RP36-0-C001
Bag 13	H3TA10RP36-0-F005	36	2000	Analytical	2000 Leopard Frog Study		
Bag 13	H3TA10RP36-0-M002	36	2000	Analytical	2000 Leopard Frog Study		
Bag 17	H3TA10RP37-0-F007	37	2000	Analytical	2000 Leopard Frog Study	Y	H3TA10RP37-0-C001
Bag 17	H3TA10RP37-0-F008	37	2000	Analytical	2000 Leopard Frog Study		
Bag 16	H3TA10RP37-0-M004	37	2000	Analytical	2000 Leopard Frog Study		
Bag18	H3TA10RP37-0-M006	37	2000	Analytical	2000 Leopard Frog Study		
Bag 19	H3TA12RP38-0-F003	38	2000	Analytical	2000 Leopard Frog Study	Y	H3TA12RP38-0-C001
Bag 19	H3TA12RP38-0-F005	38	2000	Analytical	2000 Leopard Frog Study		
Bag 21	H3TA12RP38-0-M005	38	2000	Analytical	2000 Leopard Frog Study		
Bag 21	H3TA12RP38-0-M006	38	2000	Analytical	2000 Leopard Frog Study		
Bag 22	H3TA12RP39-0-F003	39	2000	Analytical	2000 Leopard Frog Study	Y	H3TA12RP39-0-C001

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

Appendix C

HOUSATONIC RIVER PROJECT *Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000 TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Adult Leopard Frog Samples for Chemical Analysis

[Freezer] Location	Sample ID	Site	Date collected	Description:	Study	Total PCBs ¹	Composite ID
Bag 22	H3TA12RP39-0-F004	39	2000	Analytical	2000 Leopard Frog Study		
Bag 22	H3TA12RP39-0-F005	39	2000	Analytical	2000 Leopard Frog Study		
Bag 24	H3TA12RP39-0-M001	39	2000	Analytical	2000 Leopard Frog Study		
Bag 24	H3TA12RP39-0-M005	39	2000	Analytical	2000 Leopard Frog Study		
Bag 24	H3TA12RP39-0-M007	39	2000	Analytical	2000 Leopard Frog Study		
Bag 26	R1-F002	R1	2000	Analytical	2000 Leopard Frog Study	Y	R1-C001
Bag 27	R1-F004	R1	2000	Analytical	2000 Leopard Frog Study		
Bag 25	R1-M002	R1	2000	Analytical	2000 Leopard Frog Study		
Bag 25	R1-M003	R1	2000	Analytical	2000 Leopard Frog Study		
Bag 30	R2-F007	R2	2000	Analytical	2000 Leopard Frog Study	Y	R2-C001
Bag 30	R2-F008	R2	2000	Analytical	2000 Leopard Frog Study		
Bag 29	R2-M007	R2	2000	Analytical	2000 Leopard Frog Study		
Bag 29	R2-M008	R2	2000	Analytical	2000 Leopard Frog Study		
Bag 33	R3-F004	R3	2000	Analytical	2000 Leopard Frog Study	Y	R3-C001
Bag32	R3-M004	R3	2000	Analytical	2000 Leopard Frog Study		

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

HOUSATONIC RIVER PROJECT
***Rana pipiens* REPRODUCTION and DEVELOPMENT STUDY 2000**
TISSUE SAMPLES FOR ORGANIC and METALS ANALYSES

Leopard Frog Crossover Larvae Samples

FEL Lab	RP	Weston	FEL Lab	Sample	Total	new
Location	Site	Sample I.D. No.	No.	Description	PCBs¹	ID
Bag 41	R1		R1-F001	Hatched Embryos	Y	R1-F001-00-C1
	R1		R1-F001	Hatched Embryos	Y	R1-F001-00-C2
	R1	Crossover Study	R1-F001	Hatched Embryos Raised in Site 33 Water	Y	R1-F001-33-E1
Bag 42	R4	Spike Study	R4-Egg Mass	FETAX Water/Sand Exposed	Y	R4-EM01-00-C1
	R4	Spike Study	R4-Egg Mass	Site 40 Water/Sediment Exposed	Y	R4-EM01-40-E1
	R4	Spike Study	R4-Egg Mass	Site 40 Water/Sed. Spiked w/ 30 mg/kg Aro 1260	Y	R4-EM01-40-S1

2000

¹Tissue samples selected for organic and metals analyses by EVS Environment Consultants.

Exposure Assessment total PCBs

HOUSATONIC RIVER PROJECT
***RANA pipiens* 2000 STUDY**
EXPOSURE ASSESSMENT FOR WATER PCB VALUES¹

2000 LEOPARD FROG REPRODUCTION STUDY		
Vernal pool ID	Water sample ID	Total PCB (µg/L)
E-5	H3-SW000027-0-0M30	0.043
W-9a	H3-SW000030-0-0M30	0.013
W-8	H3-SW000029-0-0M30	0.14
DUP.	H3-SW000029-1-0M30	0.036
W-7a	H3-SW000028-0-0M30	0.03
W-6	H3-SW000032-0-0M30	0.22
W-4	H3-SW000031-0-0M30	0.013
EW-3	H3-SW000034-0-0M30	0.41
E-1	H3-SW000035-0-0M30	0.24
W-1	H3-SW000033-0-0M30	0.013
MP REF.	H9-SW000049-0-0Y24	0.013

¹Based on work done by EVS Environment Consultants.

HOUSATONIC RIVER PROJECT
***RANA pipiens* 2000 STUDY**
EXPOSURE ASSESSMENT FOR SEDIMENT PCB VALUES¹

2000 LEOPARD FROG REPRODUCTION STUDY		
Vernal pool ID	Sediment sample ID	Total PCB (mg/kg)
E-5	H3-SE001246-0-0000	37.0
W-9a	H3-SE001249-0-0000	4.3
W-8	H3-SE001248-0-0000	120.0
W-7a	H3-SE001247-0-0000	18.0
W-6	H3-SE001251-0-0000	42.0
W-4	H3-SE001250-0-0000	0.46
EW-3	H3-SE001253-0-0000	30.0
E-1	H3-SE001245-0-0000	160.0
W-1	H3-SE001252-0-0000	0.15
MP REF.	H9-SE001279-0-0000	0.04

¹Based on work done by EVS Environment Consultants.

total PCB Analytical Results for Water and Sediment Samples

Appendix C

Rana pipiens Developmental Study 2000 PCB Test Results Water Samples

Site ID					
Location ID	SW000027	SW000028	SW000029	SW000029	SW000030
Field Sample ID	H3-SW000027-0-0M30	H3-SW000028-0-0M30	H3-SW000029-0-0M30	H3-SW000029-1-0M30	H3-SW000030-0-0M30
Date Collected	03/30/2000	03/30/2000	03/30/2000	03/30/2000	03/30/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA_COE	EPA_COE	EPA_COE	EPA_COE	EPA_COE
Analyte					
PCBS					
AROCLOR-1016 (ug/l)	0.013 UJ	0.013 UJ	0.026 U	0.013 UJ	0.013 R
AROCLOR-1221 (ug/l)	0.013 UJ	0.013 UJ	0.026 U	0.013 UJ	0.013 R
AROCLOR-1232 (ug/l)	0.013 UJ	0.013 UJ	0.026 U	0.013 UJ	0.013 R
AROCLOR-1242 (ug/l)	0.013 UJ	0.013 UJ	0.026 U	0.013 UJ	0.013 R
AROCLOR-1248 (ug/l)	0.013 UJ	0.013 UJ	0.026 U	0.013 UJ	0.013 R
AROCLOR-1254 (ug/l)	0.015 J	0.013 UJ	0.029	0.016 J	0.013 R
AROCLOR-1260 (ug/l)	0.028 J	0.030 J	0.11 J	0.020 J	0.013 R
PCB, TOTAL (ug/l)	0.043 J	0.030 J	0.14 J	0.036 J	0.0013 R

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

Rana pipiens Developmental Study 2000 PCB Test Results Water Samples

Site ID					
Location ID	SW000031	SW000032	SW000033	SW000034	SW000035
Field Sample ID	H3-SW000031-0-0M30	H3-SW000032-0-0M30	H3-SW000033-0-0M30	H3-SW000034-0-0M30	H3-SW000035-0-0M30
Date Collected	03/30/2000	03/30/2000	03/30/2000	03/30/2000	03/30/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA_COE	EPA_COE	EPA_COE	EPA_COE	EPA_COE
Analyte					
PCBS					
AROCLOR-1016 (ug/l)	0.013 U	0.026 U	0.013 UJ	0.051 U	0.025 U
AROCLOR-1221 (ug/l)	0.013 U	0.026 U	0.013 UJ	0.051 U	0.025 U
AROCLOR-1232 (ug/l)	0.013 U	0.026 U	0.013 UJ	0.051 U	0.025 U
AROCLOR-1242 (ug/l)	0.013 U	0.026 U	0.013 UJ	0.051 U	0.025 U
AROCLOR-1248 (ug/l)	0.013 U	0.026 U	0.013 UJ	0.051 U	0.025 U
AROCLOR-1254 (ug/l)	0.013 U	0.044	0.013 UJ	0.067	0.048
AROCLOR-1260 (ug/l)	0.013 UJ	0.18 J	0.013 UJ	0.34 J	0.19 J
PCB, TOTAL (ug/l)	0.0013 UJ	0.22 J	0.0013 UJ	0.41 J	0.24 J

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

Rana pipiens Developmental Study 2000 PCB Test Results Sediment Samples

Site ID					
Location ID	SE001245	SE001246	SE001247	SE001248	SE001248
Field Sample ID	H3-SE001245-0-0000	H3-SE001246-0-0000	H3-SE001247-0-0000	H3-SE001248-0-0000	H3-SE001248-1-0000
Date Collected	03/30/2000	03/30/2000	03/30/2000	03/30/2000	03/30/2000
Depth	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Source	EPA_COE	EPA_COE	EPA_COE	EPA_COE	EPA_COE
Analyte					
PCBS					
AROCLOR-1016 (ug/kg)	12000 R	3800 U	1800 U	9800 U	13000 U
AROCLOR-1221 (ug/kg)	12000 R	3800 U	1800 U	9800 U	13000 U
AROCLOR-1232 (ug/kg)	12000 R	3800 U	1800 U	9800 U	13000 U
AROCLOR-1242 (ug/kg)	12000 R	3800 U	1800 U	9800 U	13000 U
AROCLOR-1248 (ug/kg)	12000 R	3800 U	1800 U	9800 U	13000 U
AROCLOR-1254 (ug/kg)	25000 J	7900	2300	18000	22000
AROCLOR-1260 (ug/kg)	130000 J	29000	16000	100000	100000
PCB, TOTAL (ug/kg)	160000 J	37000	18000	120000	120000

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

Rana pipiens Developmental Study 2000 PCB Test Results Sediment Samples

Site ID					
Location ID	SE001249	SE001250	SE001251	SE001252	SE001253
Field Sample ID	H3-SE001249-0-0000	H3-SE001250-0-0000	H3-SE001251-0-0000	H3-SE001252-0-0000	H3-SE001253-0-0000
Date Collected	03/30/2000	03/30/2000	03/30/2000	03/30/2000	03/30/2000
Depth	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Source	EPA_COE	EPA_COE	EPA_COE	EPA_COE	EPA_COE
Analyte					
PCBS					
AROCLOR-1016 (ug/kg)	540 U	79.0 U	3900 U	88.0 R	4100 U
AROCLOR-1221 (ug/kg)	540 U	79.0 U	3900 U	88.0 R	4100 U
AROCLOR-1232 (ug/kg)	540 U	79.0 U	3900 U	88.0 R	4100 U
AROCLOR-1242 (ug/kg)	540 U	79.0 U	3900 U	88.0 R	4100 U
AROCLOR-1248 (ug/kg)	540 U	79.0 U	3900 U	88.0 R	4100 U
AROCLOR-1254 (ug/kg)	1100 J	79.0 U	7200	150 J	5100
AROCLOR-1260 (ug/kg)	3200	460	35000	88.0 R	25000
PCB, TOTAL (ug/kg)	4300 J	460	42000	150 J	30000

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

Rana pipiens Developmental Study 2000 PCB Test Results Sediment Samples

Site ID	
Location ID	SE001279
Field Sample ID	H9-SE001279-0-0000
Date Collected	05/24/2000
Depth	0.0-0.2
Source	EPA_COE
Analyte	
PCBS	
AROCLOR-1016 (ug/kg)	39.0 U
AROCLOR-1221 (ug/kg)	39.0 U
AROCLOR-1232 (ug/kg)	39.0 U
AROCLOR-1242 (ug/kg)	39.0 U
AROCLOR-1248 (ug/kg)	39.0 U
AROCLOR-1254 (ug/kg)	40.0
AROCLOR-1260 (ug/kg)	39.0 U
PCB, TOTAL (ug/kg)	40.0

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Organic & Metals Analytical Results (COCs) For Tissue Samples

Appendix C

***RANA pipiens* Study 2000**
COC Test Results
Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	1	2	3	4	5
Field Sample ID	H3-TO08RP34-0-F005	R2-F009(OFFAL)	R1-F006(OFFAL)	H3-TO04RP32-0-F006	H3-TO12RP39-0-F001
Sample Location: Weston (Woodlot)	RP34 (W-7A)	R2 Reference	R1 Reference	RP32 (W-9A)	RP39 (W-1)
Date Collected	04/03/2000	04/26/2000	04/28/2000	05/01/2000	05/03/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
APP IX PESTICIDES					
1,2,3,4-TETRACHLOROBENZENE (ng/g)	2.651 (10)	0.45 J (10)	4.953 (10)	1.32 J (10)	2.232 U (10)
1,2,4,5-TETRACHLOROBENZENE (ng/g)	5.035 (10)	3.797 (10)	8.23 (10)	1.224 J (10)	0.574 J (10)
4,4'-DDD (ng/g)	2.247 U (10)	2.463 U (10)	2.212 U (10)	0.91 J (10)	2.232 U (10)
4,4'-DDE (ng/g)	1.259 J (10)	0.612 J (10)	1.864 J (10)	6.662 (10)	0.926 J (10)
4,4'-DDT (ng/g)	2.247 U (10)	2.463 U (10)	5.795 (10)	4.219 U (10)	5.72 (10)
ALDRIN (ng/g)	2.247 U (10)	2.463 U (10)	2.212 U (10)	4.219 U (10)	2.232 U (10)
ALPHA-BHC (ng/g)	0.095 J (10)	0.339 J (10)	1.102 J (10)	4.219 U (10)	0.145 J (10)
ALPHA-CHLORDANE (ng/g)	2.247 U (10)	2.463 U (10)	2.212 U (10)	4.219 U (10)	2.232 U (10)
BETA-BHC (ng/g)	0.106 J (10)	0.317 J (10)	0.35 J (10)	4.219 U (10)	1.506 J (10)
CHLORPYRIFOS (ng/g)	2.247 U (10)	2.463 U (10)	2.212 U (10)	4.219 U (10)	2.232 U (10)
CIS-NONACHLOR (ng/g)	2.247 U (10)	2.463 U (10)	2.212 U (10)	4.219 U (10)	2.232 U (10)
DELTA-BHC (ng/g)	2.247 U (10)	2.463 U (10)	0.532 J (10)	4.219 U (10)	2.232 U (10)
DIELDRIN (ng/g)	2.247 U (10)	2.463 U (10)	1.4 J (10)	4.219 U (10)	2.232 U (10)
ENDOSULFAN II (ng/g)	2.247 U (10)	2.463 U (10)	2.212 U (10)	4.219 U (10)	2.232 U (10)
ENDRIN (ng/g)	2.247 U (10)	2.463 U (10)	2.212 U (10)	4.219 U (10)	2.232 U (10)
GAMMA BHC (LINDANE) (ng/g)	2.247 U (10)	2.463 U (10)	0.406 J (10)	4.219 U (10)	2.232 U (10)
GAMMA-CHLORDANE (ng/g)	2.247 U (10)	2.463 U (10)	2.212 U (10)	4.219 U (10)	2.232 U (10)
HEPTACHLOR (ng/g)	2.247 U (10)	2.463 U (10)	2.144 J (10)	4.219 U (10)	2.232 U (10)
HEPTACHLOR EPOXIDE (ng/g)	0.307 J (10)	2.463 U (10)	0.059 J (10)	4.219 U (10)	2.232 U (10)
HEXACHLOROBENZENE (ng/g)	0.073 J (10)	0.067 J (10)	0.57 J (10)	4.219 U (10)	0.051 J (10)
MIREX (ng/g)	2.247 U (10)	2.463 U (10)	2.212 U (10)	4.219 U (10)	2.232 U (10)
O,P'-DDD (ng/g)	0.84 J (10)	2.463 U (10)	2.212 U (10)	4.219 U (10)	2.232 U (10)
O,P'-DDE (ng/g)	2.247 U (10)	2.463 U (10)	2.212 U (10)	4.219 U (10)	2.232 U (10)
O,P'-DDT (ng/g)	0.799 J (10)	2.463 U (10)	2.212 U (10)	4.104 J (10)	2.232 U (10)
OXYCHLORDANE (ng/g)	3.256 (10)	2.463 U (10)	1.852 J (10)	0.917 J (10)	1.346 J (10)
PENTACHLOROANISOLE (ng/g)	0.361 J (10)	2.463 U (10)	2.212 U (10)	4.219 U (10)	0.398 J (10)
PENTACHLOROBENZENE (ng/g)	1.534 J (10)	2.463 U (10)	2.212 U (10)	0.356 J (10)	2.232 U (10)
TOXAPHENE (ng/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.2 U (10)	22.3 U (10)
TRANS-NONACHLOR (ng/g)	2.247 U (10)	2.463 U (10)	2.212 U (10)	4.219 U (10)	2.232 U (10)
APP IX PESTICIDES, Total (ng/g)	16.316	5.582	29.257	15.493	10.666

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	1	2	3	4	5
Field Sample ID	H3-TO08RP34-0-F005	R2-F009(OFFAL)	R1-F006(OFFAL)	H3-TO04RP32-0-F006	H3-TO12RP39-0-F001
Sample Location: Weston (Woodlot)	RP34 (W-7A)	R2 Reference	R1 Reference	RP32 (W-9A)	RP39 (W-1)
Date Collected	04/03/2000	04/26/2000	04/28/2000	05/01/2000	05/03/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
DIOXINS/FURANS					
1,2,3,4,6,7,8-HPCDD (pg/g)	22.5 U (10)	12.6 J (10)	22.1 U (10)	42.4 U (10)	22.3 U (10)
1,2,3,4,6,7,8-HPCDF (pg/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.4 U (10)	22.3 U (10)
1,2,3,4,7,8,9-HPCDF (pg/g)	22.5 U (10)	8.1 J (10)	1 J (10)	42.4 U (10)	22.3 U (10)
1,2,3,4,7,8-HXCDD (pg/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.4 U (10)	22.3 U (10)
1,2,3,4,7,8-HXCDF (pg/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.4 U (10)	22.3 U (10)
1,2,3,6,7,8-HXCDD (pg/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.4 U (10)	22.3 U (10)
1,2,3,6,7,8-HXCDF (pg/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.4 U (10)	22.3 U (10)
1,2,3,7,8,9-HXCDD (pg/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.4 U (10)	22.3 U (10)
1,2,3,7,8,9-HXCDF (pg/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.4 U (10)	22.3 U (10)
1,2,3,7,8-PECDD (pg/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.4 U (10)	22.3 U (10)
1,2,3,7,8-PECDF (pg/g)	22.5 U (10)	24.6 U (10)	5.4 J (10)	42.4 U (10)	22.3 U (10)
2,3,4,6,7,8-HXCDF (pg/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.4 U (10)	22.3 U (10)
2,3,4,7,8-PECDF (pg/g)	22.5 U (10)	10.1 J (10)	22.1 U (10)	42.4 U (10)	22.3 U (10)
2,3,7,8-TCDD (pg/g)	4.5 U (10)	4.9 U (10)	4.4 U (10)	8.5 U (10)	4.5 U (10)
2,3,7,8-TCDF (pg/g)	4.5 U (10)	4.9 U (10)	4.4 U (10)	8.5 U (10)	4.5 U (10)
OCDD (pg/g)	45 U (10)	60.1 (10)	9.9 J (10)	84.7 U (10)	44.6 U (10)
OCDF (pg/g)	45 U (10)	36.8 J (10)	7 J (10)	84.7 U (10)	21.3 J (10)
DIOXINS/FURANS, Total (pg/g)		127.7	23.3		21.3

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	1	2	3	4	5
Field Sample ID	H3-TO08RP34-0-F005	R2-F009(OFFAL)	R1-F006(OFFAL)	H3-TO04RP32-0-F006	H3-TO12RP39-0-F001
Sample Location: Weston (Woodlot)	RP34 (W-7A)	R2 Reference	R1 Reference	RP32 (W-9A)	RP39 (W-1)
Date Collected	04/03/2000	04/26/2000	04/28/2000	05/01/2000	05/03/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
METALS					
ALUMINUM (ug/g)	10.25 (10)	8.61 (10)	9.56 (10)	20.75 (10)	11.4 (10)
ARSENIC (ug/g)	0.42 J (10)	0.47 U (10)	0.38 J (10)	0.24 J (10)	0.2 J (10)
BARIUM (ug/g)	5.08 (10)	16.51 (10)	3.99 (10)	12.27 (10)	8.83 (10)
BERYLLIUM (ug/g)	0.09 U (10)	0.09 U (10)	0.1 U (10)	0.14 U (10)	0.1 U (10)
CADMIUM (ug/g)	0.43 (10)	0.13 (10)	0.21 (10)	0.19 (10)	0.26 (10)
CHROMIUM (ug/g)	3.7 (10)	7.44 (10)	2.06 (10)	7.81 (10)	6.41 (10)
COPPER (ug/g)	17.1 (10)	5.42 (10)	6.08 (10)	3.4 (10)	18.46 (10)
IRON (ug/g)	163.51 (10)	63.59 (10)	108.61 (10)	85.38 (10)	111.56 (10)
LEAD (ug/g)	0.29 J (10)	0.15 J (10)	0.12 J (10)	0.75 (10)	0.55 (10)
MAGNESIUM (ug/g)	1145.12 (10)	1554.74 (10)	929.68 (10)	1314.88 (10)	1464.83 (10)
MANGANESE (ug/g)	6.44 (10)	9.27 (10)	6.62 (10)	18.15 (10)	17.28 (10)
MERCURY (ug/g)	0.23 (10)	0.07 J (10)	0.09 J (10)	0.22 (10)	0.13 J (10)
NICKEL (ug/g)	0.47 U (10)	0.47 U (10)	0.51 U (10)	0.69 U (10)	0.03 J (10)
SELENIUM (ug/g)	1.05 (10)	0.24 J (10)	1.17 (10)	0.85 (10)	0.88 (10)
STRONTIUM (ug/g)	4.87 (10)	109.8 (10)	12.23 (10)	14.47 (10)	12.32 (10)
VANADIUM (ug/g)	0.21 J (10)	1.24 (10)	0.25 J (10)	1.15 (10)	1.01 (10)
ZINC (ug/g)	57.63 (10)	95.39 (10)	149.25 (10)	69.44 (10)	110.38 (10)
ORGANIC					
PERCENT LIPIDS (GC) (%)	0.4 (10)	1.2 (10)	3 (10)	0.4 (10)	0.8 (10)
PERCENT LIPIDS (GC/MS) (%)	0.4 (10)	1.2 (10)	3 (10)	0.4 (10)	0.8 (10)
PERCENT LIPIDS (OTHER) (%)	0.4 (10)	1.2 (10)	3 (10)	0.4 (10)	0.8 (10)

Result Suffix Symbols:

R=Reject 0=Unvalidated

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J=Estimated 11=Completeness Check Complete

Appendix C

RANA pipiens Study 2000
COC Test Results
Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	1	2	3	4	5
Field Sample ID	H3-TO08RP34-0-F005	R2-F009(OFFAL)	R1-F006(OFFAL)	H3-TO04RP32-0-F006	H3-TO12RP39-0-F001
Sample Location: Weston (Woodlot)	RP34 (W-7A)	R2 Reference	R1 Reference	RP32 (W-9A)	RP39 (W-1)
Date Collected	04/03/2000	04/26/2000	04/28/2000	05/01/2000	05/03/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
PAHS					
1,6,7-TRIMETHYLNAPHTHALENE (ng/g)	0.4 J (10)	0.5 J (10)	2.5 (10)	1.4 J (10)	0.4 J (10)
1-METHYLNAPHTHALENE (ng/g)	1.2 J (10)	1.1 J (10)	2.5 (10)	3.3 (10)	0.6 J (10)
1-METHYLPHENANTHRENE (ng/g)	0.5 J (10)	2.1 J (10)	3.1 (10)	1.2 J (10)	0.3 J (10)
2,6 DIMETHYLNAPHTHALENE (ng/g)	0.9 J (10)	0.8 J (10)	1.1 J (10)	1.4 J (10)	0.5 J (10)
2-METHYLNAPHTHALENE (ng/g)	2 (10)	1.9 (10)	2.2 (10)	3.4 (10)	1 J (10)
ACENAPHTHENE (ng/g)	1.3 J (10)	1.1 J (10)	0.7 J (10)	1 J (10)	0.2 J (10)
ACENAPHTHYLENE (ng/g)	0.4 J (10)	0.3 J (10)	4.6 (10)	0.9 J (10)	0.3 J (10)
ANTHRACENE (ng/g)	0.4 J (10)	0.4 J (10)	0.2 J (10)	0.6 J (10)	0.3 J (10)
BENZO(A)ANTHRACENE (ng/g)	0.3 J (10)	0.2 J (10)	0.2 J (10)	0.5 J (10)	0.4 J (10)
BENZO(A)PYRENE (ng/g)	0.4 J (10)	0.2 J (10)	0.6 J (10)	0.3 J (10)	0.5 J (10)
BENZO(B)FLUORANTHENE (ng/g)	0.4 J (10)	0.2 J (10)	0.2 J (10)	0.6 J (10)	0.4 J (10)
BENZO(E)PYRENE (ng/g)	0.2 J (10)	0.2 J (10)	0.3 J (10)	0.3 J (10)	0.3 J (10)
BENZO(GHI)PERYLENE (ng/g)	0.3 J (10)	0.2 J (10)	0.1 J (10)	0.3 J (10)	0.6 J (10)
BENZO(K)FLUORANTHENE (ng/g)	0.1 J (10)	0.1 J (10)	1.7 U (10)	0.3 J (10)	0.3 J (10)
BIPHENYL (DIPHENYL) (ng/g)	2.4 J (10)	2.7 J (10)	3.9 (10)	4.2 J (10)	1.1 J (10)
C1-CHRYSENE (ng/g)	4.8 U (10)	5.2 U (10)	4.7 U (10)	0.1 J (10)	4.7 U (10)
C1-DIBENZOTHIOPHENES (ng/g)	0.2 J (10)	0.6 J (10)	3.4 (10)	0.5 J (10)	2 U (10)
C1-FLUORANTHENE & PYRENE (ng/g)	0.1 J (10)	0.1 J (10)	0.2 J (10)	0.1 J (10)	0.1 J (10)
C1-FLUORENE (ng/g)	0.4 J (10)	3.6 J (10)	10.3 (10)	4.9 J (10)	2.8 J (10)
C1-NAPHTHALENES (ng/g)	3.2 (10)	3 J (10)	4.7 (10)	6.7 (10)	1.6 J (10)
C1-PHENANTHRENE & ANTHRACENE (ng/g)	1 J (10)	4.2 J (10)	22.7 (10)	2.1 J (10)	3.5 J (10)
C2-CHRYSENE (ng/g)	0.2 J (10)	5.2 U (10)	0.3 J (10)	0.1 J (10)	4.7 U (10)
C2-DIBENZOTHIOPHENES (ng/g)	2 U (10)	1.5 J (10)	2.3 (10)	0.1 J (10)	2 U (10)

Result Suffix Symbols:

R=Reject 0=Unvalidated

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J=Estimated 11=Completeness Check Complete

Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	1	2	3	4	5
Field Sample ID	H3-TO08RP34-0-F005	R2-F009(OFFAL)	R1-F006(OFFAL)	H3-TO04RP32-0-F006	H3-TO12RP39-0-F001
Sample Location: Weston (Woodlot)	RP34 (W-7A)	R2 Reference	R1 Reference	RP32 (W-9A)	RP39 (W-1)
Date Collected	04/03/2000	04/26/2000	04/28/2000	05/01/2000	05/03/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
C2-FLUORENES (ng/g)	0.1 J (10)	0.4 J (10)	15 (10)	1.9 J (10)	0.1 J (10)
C2-NAPHTHALENES (ng/g)	2.6 J (10)	2.2 J (10)	9 (10)	4.8 J (10)	0.7 J (10)
C2-PHENANTHRENES & ANTHRACENES (ng/g)	0.1 J (10)	1 J (10)	1.2 J (10)	0.3 J (10)	4 U (10)
C3-CHRYSENES (ng/g)	0.2 J (10)	5.2 U (10)	0.2 J (10)	0.1 J (10)	0.1 J (10)
C3-DIBENZOTHIOPHENES (ng/g)	2 U (10)	1 J (10)	1.5 J (10)	0.1 J (10)	2 U (10)
C3-FLUORENES (ng/g)	0.4 J (10)	0.3 J (10)	14.6 (10)	0.7 J (10)	1.4 J (10)
C3-NAPHTHALENES (ng/g)	1.1 J (10)	1.1 J (10)	9.9 (10)	2.5 J (10)	0.6 J (10)
C3-PHENANTHRENES & ANTHRACENES (ng/g)	0.1 J (10)	0.1 J (10)	0.7 J (10)	0.1 J (10)	4 U (10)
C4-CHRYSENES (ng/g)	4.8 U (10)	5.2 U (10)	0.1 J (10)	0.1 J (10)	4.7 U (10)
C4-NAPHTHALENES (ng/g)	0.1 J (10)	0.3 J (10)	2.8 J (10)	0.1 J (10)	5.1 U (10)
C4-PHENANTHRENES & ANTHRACENES (ng/g)	0.1 J (10)	4.5 U (10)	0.2 J (10)	0.1 J (10)	0.1 J (10)
CHRYSENE (ng/g)	0.3 J (10)	0.2 J (10)	0.3 J (10)	0.5 J (10)	0.6 J (10)
DIBENZO(A,H)ANTHRACENE (ng/g)	0.2 J (10)	0.1 J (10)	0.7 U (10)	0.1 J (10)	0.6 J (10)
DIBENZOTHIOPHENE (ng/g)	0.3 J (10)	0.2 J (10)	0.7 J (10)	0.4 J (10)	0.2 J (10)
FLUORANTHENE (ng/g)	0.8 J (10)	0.5 J (10)	0.6 J (10)	1 J (10)	0.5 J (10)
FLUORENE (ng/g)	1.7 J (10)	1.2 J (10)	1.1 J (10)	1.7 J (10)	0.8 J (10)
INDENO(1,2,3-C,D)PYRENE (ng/g)	0.2 J (10)	0.1 J (10)	0.7 U (10)	0.3 J (10)	0.6 J (10)
NAPHTHALENE (ng/g)	5.2 (10)	4.8 (10)	4.9 (10)	14.6 (10)	4 (10)
PERYLENE (ng/g)	0.4 J (10)	0.3 J (10)	0.9 J (10)	0.1 J (10)	0.8 J (10)
PHENANTHRENE (ng/g)	2.3 J (10)	1.6 J (10)	2.4 (10)	3.2 J (10)	1.1 J (10)
PYRENE (ng/g)	1.1 J (10)	0.4 J (10)	0.6 J (10)	1.1 J (10)	0.5 J (10)
PAHS, Total (ng/g)	33.6	40.8	132.8	68.1	27.9

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Appendix C

***RANA pipiens* Study 2000**
COC Test Results
Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	1	2	3	4	5
Field Sample ID	H3-TO08RP34-0-F005	R2-F009(OFFAL)	R1-F006(OFFAL)	H3-TO04RP32-0-F006	H3-TO12RP39-0-F001
Sample Location: Weston (Woodlot)	RP34 (W-7A)	R2 Reference	R1 Reference	RP32 (W-9A)	RP39 (W-1)
Date Collected	04/03/2000	04/26/2000	04/28/2000	05/01/2000	05/03/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
PCB CONGENERES					
PCB-1 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-101/90 (ng/g)	4.541 (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-105 (ng/g)	3.052 (10)	0.053 (10)	0.124 (10)	15.903 (10)	0.066 (10)
PCB-107 (ng/g)	0.229 (10)	0.0246 U (10)	0.0221 U (10)	0.34 (10)	0.0223 U (10)
PCB-110 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.645 (10)	0.0422 U (10)	0.0223 U (10)
PCB-114 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-118 (ng/g)	3.073 (10)	0.0246 U (10)	0.0221 U (10)	66.876 (10)	0.0223 U (10)
PCB-119 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-126 (ng/g)	0.007 J (10)	0.006 J (10)	0.006 J (10)	0.029 J (10)	0.0223 U (10)
PCB-128 (ng/g)	0.97 (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-129 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-130 (ng/g)	0.492 (10)	0.0246 U (10)	0.0221 U (10)	11.494 (10)	0.0223 U (10)
PCB-135 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-136 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-138/160 (ng/g)	23.181 (10)	0.678 (10)	0.0221 U (10)	67.349 (10)	1.278 (10)
PCB-141/179 (ng/g)	2.326 (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-146 (ng/g)	7.101 (10)	0.0246 U (10)	0.0221 U (10)	27.007 (10)	0.766 (10)
PCB-149/123 (ng/g)	2.066 (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-15 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-151 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-153/132 (ng/g)	39.212 (10)	0.454 (10)	1.801 (10)	239.561 (10)	2.246 (10)
PCB-156 (ng/g)	1.391 (10)	0.0246 U (10)	0.0221 U (10)	19.83 (10)	0.0223 U (10)
PCB-158 (ng/g)	2.462 (10)	0.0246 U (10)	0.0221 U (10)	4.504 (10)	0.0223 U (10)
PCB-16/32 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-166 (ng/g)	0.0225 U (10)	0.096 (10)	0.0221 U (10)	1.903 (10)	0.0223 U (10)
PCB-167 (ng/g)	1.24 (10)	0.0246 U (10)	0.0221 U (10)	19.798 (10)	0.0223 U (10)
PCB-169 (ng/g)	0.042 (10)	0.005 J (10)	0.008 J (10)	0.03 J (10)	0.0223 U (10)
PCB-170/190 (ng/g)	10.737 (10)	0.0246 U (10)	0.0221 U (10)	134.027 (10)	0.284 (10)
PCB-171/202 (ng/g)	2.766 (10)	0.0246 U (10)	0.0221 U (10)	3.104 (10)	0.0223 U (10)
PCB-172 (ng/g)	2.166 (10)	0.0246 U (10)	0.0221 U (10)	3.765 (10)	0.068 (10)
PCB-174 (ng/g)	1.141 (10)	0.0246 U (10)	0.0221 U (10)	0.683 (10)	0.0223 U (10)

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Appendix C

***RANA pipiens* Study 2000**
COC Test Results
Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	1	2	3	4	5
Field Sample ID	H3-TO08RP34-0-F005	R2-F009(OFFAL)	R1-F006(OFFAL)	H3-TO04RP32-0-F006	H3-TO12RP39-0-F001
Sample Location: Weston (Woodlot)	RP34 (W-7A)	R2 Reference	R1 Reference	RP32 (W-9A)	RP39 (W-1)
Date Collected	04/03/2000	04/26/2000	04/28/2000	05/01/2000	05/03/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
PCB-175 (ng/g)	0.463 (10)	0.113 (10)	0.085 (10)	1.206 (10)	0.095 (10)
PCB-176/137 (ng/g)	0.352 (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-177 (ng/g)	1.758 (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-178 (ng/g)	1.356 (10)	0.0246 U (10)	0.0221 U (10)	0.565 (10)	0.0223 U (10)
PCB-18/17 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-180 (ng/g)	33.587 (10)	0.653 (10)	0.458 (10)	160.511 (10)	1.193 (10)
PCB-183 (ng/g)	6.627 (10)	0.0246 U (10)	0.0221 U (10)	36.844 (10)	0.202 (10)
PCB-185 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-187 (ng/g)	40.038 (10)	0.0246 U (10)	0.0221 U (10)	154.679 (10)	1.043 (10)
PCB-189 (ng/g)	0.53 (10)	0.0246 U (10)	0.0221 U (10)	5.701 (10)	0.0223 U (10)
PCB-191 (ng/g)	0.472 (10)	0.0246 U (10)	0.0221 U (10)	3.858 (10)	0.0223 U (10)
PCB-193 (ng/g)	2.63 (10)	0.0246 U (10)	0.0221 U (10)	14.921 (10)	0.0223 U (10)
PCB-194 (ng/g)	8.164 (10)	0.0246 U (10)	0.0221 U (10)	68.913 (10)	0.21 (10)
PCB-195/208 (ng/g)	4.798 (10)	6.743 (10)	0.0221 U (10)	24.754 (10)	0.347 (10)
PCB-197 (ng/g)	0.243 (10)	0.0246 U (10)	0.0221 U (10)	0.419 (10)	0.0223 U (10)
PCB-199 (ng/g)	6.558 (10)	0.0246 U (10)	0.0221 U (10)	19.157 (10)	0.189 (10)
PCB-200 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.011 J (10)
PCB-201/157/173 (ng/g)	0.475 (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-203/196 (ng/g)	8.042 (10)	0.0246 U (10)	0.0221 U (10)	66.487 (10)	0.205 (10)
PCB-205 (ng/g)	0.613 (10)	0.0246 U (10)	0.0221 U (10)	4.425 (10)	0.0223 U (10)
PCB-206 (ng/g)	1.608 (10)	0.0246 U (10)	0.0221 U (10)	10.557 (10)	0.194 (10)
PCB-207 (ng/g)	0.358 (10)	0.248 (10)	0.256 (10)	1.179 (10)	0.0223 U (10)
PCB-209 (ng/g)	0.521 (10)	0.502 (10)	0.31 (10)	1.708 (10)	0.436 (10)
PCB-22/51 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-24/27 (ng/g)	0.191 (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.12 (10)
PCB-25 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-26 (ng/g)	8.467 (10)	0.849 (10)	1.764 (10)	5.088 (10)	0.0223 U (10)
PCB-28 (ng/g)	0.0225 U (10)	0.0246 U (10)	1.68 (10)	0.0422 U (10)	0.0223 U (10)
PCB-29 (ng/g)	1.091 (10)	0.0246 U (10)	0.206 (10)	0.383 (10)	0.0223 U (10)
PCB-30 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-31 (ng/g)	0.0225 U (10)	0.0246 U (10)	1.803 (10)	0.0422 U (10)	0.0223 U (10)
PCB-33/20 (ng/g)	0.0225 U (10)	0.0246 U (10)	5.512 (10)	0.0422 U (10)	0.0223 U (10)

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

***RANA pipiens* Study 2000**
COC Test Results
Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	1	2	3	4	5
Field Sample ID	H3-TO08RP34-0-F005	R2-F009(OFFAL)	R1-F006(OFFAL)	H3-TO04RP32-0-F006	H3-TO12RP39-0-F001
Sample Location: Weston (Woodlot)	RP34 (W-7A)	R2 Reference	R1 Reference	RP32 (W-9A)	RP39 (W-1)
Date Collected	04/03/2000	04/26/2000	04/28/2000	05/01/2000	05/03/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
PCB-39 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-40 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-41/64 (ng/g)	0.0225 U (10)	0.0246 U (10)	1.369 (10)	0.0422 U (10)	0.0223 U (10)
PCB-42/59/37 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.621 (10)	0.0422 U (10)	0.0223 U (10)
PCB-44 (ng/g)	0.0225 U (10)	0.0246 U (10)	1.594 (10)	0.0422 U (10)	0.0223 U (10)
PCB-45 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.683 (10)	0.0422 U (10)	0.0223 U (10)
PCB-46 (ng/g)	0.301 (10)	0.0246 U (10)	0.0221 U (10)	0.532 (10)	0.0223 U (10)
PCB-47/75 (ng/g)	3.145 (10)	0.0246 U (10)	0.946 (10)	0.0422 U (10)	0.0223 U (10)
PCB-48 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-49 (ng/g)	0.267 (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-52 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-53 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-56/60 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-63 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-66 (ng/g)	0.213 (10)	0.0246 U (10)	0.779 (10)	0.0422 U (10)	0.0223 U (10)
PCB-67 (ng/g)	0.214 (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-69 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-7/9 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.208 (10)	0.0422 U (10)	0.0223 U (10)
PCB-70 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-72 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-74/61 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.508 (10)	0.0223 U (10)
PCB-77 (ng/g)	0.023 (10)	0.012 J (10)	0.043 (10)	0.049 (10)	0.0223 U (10)
PCB-8/5 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.463 (10)	0.0422 U (10)	36.16 I (10)
PCB-81 (ng/g)	0.0225 U (10)	0.001 J (10)	0.002 J (10)	0.012 J (10)	0.005 J (10)
PCB-82 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-83 (ng/g)	1.673 (10)	0.51 (10)	0.396 (10)	2.367 (10)	0.0223 U (10)
PCB-84 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-85 (ng/g)	0.0225 U (10)	0.0246 U (10)	1.127 (10)	0.0422 U (10)	0.0223 U (10)
PCB-87/115 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-91/55 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.204 (10)
PCB-92 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-95/80 (ng/g)	1.001 (10)	0.469 (10)	0.0221 U (10)	2.046 (10)	0.447 (10)

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

***RANA pipiens* Study 2000**
COC Test Results
Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	1	2	3	4	5
Field Sample ID	H3-TO08RP34-0-F005	R2-F009(OFFAL)	R1-F006(OFFAL)	H3-TO04RP32-0-F006	H3-TO12RP39-0-F001
Sample Location: Weston (Woodlot)	RP34 (W-7A)	R2 Reference	R1 Reference	RP32 (W-9A)	RP39 (W-1)
Date Collected	04/03/2000	04/26/2000	04/28/2000	05/01/2000	05/03/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
PCB-97 (ng/g)	0.0225 U (10)	0.0246 U (10)	0.0221 U (10)	0.0422 U (10)	0.0223 U (10)
PCB-99 (ng/g)	4.63 (10)	0.0246 U (10)	1.165 (10)	17.378 (10)	0.0223 U (10)
TOTAL DCB (ng/g)	0.5 J (10)	0.5 J (10)	0.3 J (10)	1.7 J (10)	0.4 J (10)
TOTAL DICB (ng/g)	22.5 U (10)	24.6 U (10)	0.7 J (10)	42.2 U (10)	22.3 U (10)
TOTAL HPCB (ng/g)	104.6 (10)	0.8 J (10)	0.5 J (10)	519.9 (10)	2.9 J (10)
TOTAL HXCB (ng/g)	80.4 (10)	1.2 J (10)	1.8 J (10)	391.4 (10)	4.5 J (10)
TOTAL MCB (ng/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.2 U (10)	22.3 U (10)
TOTAL NCB (ng/g)	2 J (10)	0.2 J (10)	0.3 J (10)	11.7 J (10)	0.2 J (10)
TOTAL OCB (ng/g)	28.9 (10)	6.7 J (10)	22.1 U (10)	184.2 (10)	1 J (10)
TOTAL PCB (ng/g)	18.2 J (10)	1 J (10)	3.5 J (10)	104.9 (10)	0.5 J (10)
TOTAL TCB (ng/g)	4.1 J (10)	24.6 U (10)	6 J (10)	4.2 J (10)	0.2 J (10)
TOTAL TRICB (ng/g)	9.7 J (10)	0.8 J (10)	11 J (10)	5.5 J (10)	0.1 J (10)
PCBS					
AROCLOR-1242 (ng/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.2 U (10)	22.3 U (10)
AROCLOR-1248 (ng/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.2 U (10)	22.3 U (10)
AROCLOR-1254 (ng/g)	22.5 U (10)	24.6 U (10)	22.1 U (10)	42.2 U (10)	22.3 U (10)
AROCLOR-1260 (ng/g)	248.5 (10)	24.6 U (10)	22.1 U (10)	1223.5 (10)	22.3 U (10)
PCB, TOTAL (ng/g)	248.5	11.4	24	1223.5	9.8

Result Suffix Symbols:

R=Reject 0=Unvalidated

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Appendix C

***RANA pipiens* Study 2000**
COC Test Results
Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	6	7	8	14	15
Field Sample ID	H3-TO10RP37-0-F009	H3-TO10RP37-0-F005	R3-F003(OFFAL)	H3-TO04RP32-1-F006	R1-F006(OFFAL)
Sample Location: Weston (Woodlot)	RP37 (EW-3)	RP37 (EW-3)	R3 Reference	RP32 (W-9A)	R1 Reference
Date Collected	05/05/2000	05/10/2000	05/18/2000	05/01/2000	04/28/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
APP IX PESTICIDES					
1,2,3,4-TETRACHLOROBENZENE (ng/g)	3.443 J (10)	0.471 J (10)	1.659 J (10)	0.72 J (10)	NA
1,2,4,5-TETRACHLOROBENZENE (ng/g)	6.319 (10)	3.391 J (10)	3.011 (10)	2.304 J (10)	NA
4,4'-DDD (ng/g)	0.623 J (10)	4.237 U (10)	2.358 U (10)	0.733 J (10)	NA
4,4'-DDE (ng/g)	6.293 (10)	2.441 J (10)	0.428 J (10)	6.492 (10)	NA
4,4'-DDT (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
ALDRIN (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
ALPHA-BHC (ng/g)	4.184 U (10)	4.237 U (10)	0.19 J (10)	3.759 U (10)	NA
ALPHA-CHLORDANE (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
BETA-BHC (ng/g)	3.092 J (10)	1.857 J (10)	1.835 J (10)	3.759 U (10)	NA
CHLORPYRIFOS (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
CIS-NONACHLOR (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
DELTA-BHC (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
DIELDRIN (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
ENDOSULFAN II (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
ENDRIN (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
GAMMA BHC (LINDANE) (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
GAMMA-CHLORDANE (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
HEPTACHLOR (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
HEPTACHLOR EPOXIDE (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
HEXACHLOROBENZENE (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
MIREX (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
O,P'-DDD (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
O,P'-DDE (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
O,P'-DDT (ng/g)	6.786 (10)	4.237 U (10)	2.358 U (10)	4.044 (10)	NA
OXYCHLORDANE (ng/g)	4.292 (10)	0.325 J (10)	0.515 J (10)	0.93 J (10)	NA
PENTACHLOROANISOLE (ng/g)	4.184 U (10)	4.237 U (10)	0.081 J (10)	3.759 U (10)	NA
PENTACHLOROBENZENE (ng/g)	0.282 J (10)	0.427 J (10)	2.358 U (10)	0.269 J (10)	NA
TOXAPHENE (ng/g)	41.8 U (10)	42.4 U (10)	23.6 U (10)	37.6 U (10)	NA
TRANS-NONACHLOR (ng/g)	4.184 U (10)	4.237 U (10)	2.358 U (10)	3.759 U (10)	NA
APP IX PESTICIDES, Total (ng/g)	31.13	8.912	7.291	15.492	NA

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	6	7	8	14	15
Field Sample ID	H3-TO10RP37-0-F009	H3-TO10RP37-0-F005	R3-F003(OFFAL)	H3-TO04RP32-1-F006	R1-F006(OFFAL)
Sample Location: Weston (Woodlot)	RP37 (EW-3)	RP37 (EW-3)	R3 Reference	RP32 (W-9A)	R1 Reference
Date Collected	05/05/2000	05/10/2000	05/18/2000	05/01/2000	04/28/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
DIOXINS/FURANS					
1,2,3,4,6,7,8-HPCDD (pg/g)	41.7 U (10)	42.4 U (10)	23.6 U (10)	18.8 U (10)	NA
1,2,3,4,6,7,8-HPCDF (pg/g)	41.7 U (10)	42.4 U (10)	23.6 U (10)	18.8 U (10)	NA
1,2,3,4,7,8,9-HPCDF (pg/g)	41.7 U (10)	42.4 U (10)	23.6 U (10)	18.8 U (10)	NA
1,2,3,4,7,8-HXCDD (pg/g)	41.7 U (10)	42.4 U (10)	23.6 U (10)	18.8 U (10)	NA
1,2,3,4,7,8-HXCDF (pg/g)	41.7 U (10)	42.4 U (10)	23.6 U (10)	18.8 U (10)	NA
1,2,3,6,7,8-HXCDD (pg/g)	41.7 U (10)	42.4 U (10)	23.6 U (10)	18.8 U (10)	NA
1,2,3,6,7,8-HXCDF (pg/g)	41.7 U (10)	42.4 U (10)	23.6 U (10)	18.8 U (10)	NA
1,2,3,7,8,9-HXCDD (pg/g)	41.7 U (10)	42.4 U (10)	23.6 U (10)	18.8 U (10)	NA
1,2,3,7,8,9-HXCDF (pg/g)	41.7 U (10)	42.4 U (10)	23.6 U (10)	18.8 U (10)	NA
1,2,3,7,8-PECDD (pg/g)	41.7 U (10)	42.4 U (10)	23.6 U (10)	18.8 U (10)	NA
1,2,3,7,8-PECDF (pg/g)	41.7 U (10)	9.3 J (10)	23.6 U (10)	18.8 U (10)	NA
2,3,4,6,7,8-HXCDF (pg/g)	41.7 U (10)	42.4 U (10)	23.6 U (10)	18.8 U (10)	NA
2,3,4,7,8-PECDF (pg/g)	41.7 U (10)	42.4 U (10)	23.6 U (10)	18.8 U (10)	NA
2,3,7,8-TCDD (pg/g)	8.3 U (10)	8.5 U (10)	4.7 U (10)	3.8 U (10)	NA
2,3,7,8-TCDF (pg/g)	8.3 U (10)	8.5 U (10)	4.7 U (10)	3.8 U (10)	NA
OCDD (pg/g)	83.3 U (10)	84.7 U (10)	47.2 U (10)	37.6 U (10)	NA
OCDF (pg/g)	83.3 U (10)	84.7 U (10)	47.2 U (10)	37.6 U (10)	NA
DIOXINS/FURANS, Total (pg/g)		9.3			NA

Result Suffix Symbols:

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Appendix C

***RANA pipiens* Study 2000**
COC Test Results
Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	6	7	8	14	15
Field Sample ID	H3-TO10RP37-0-F009	H3-TO10RP37-0-F005	R3-F003(OFFAL)	H3-TO04RP32-1-F006	R1-F006(OFFAL)
Sample Location: Weston (Woodlot)	RP37 (EW-3)	RP37 (EW-3)	R3 Reference	RP32 (W-9A)	R1 Reference
Date Collected	05/05/2000	05/10/2000	05/18/2000	05/01/2000	04/28/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
METALS					
ALUMINUM (ug/g)	4.8 J (10)	21.85 (10)	7.79 (10)	NA	6.37 (10)
ARSENIC (ug/g)	0.44 J (10)	0.23 J (10)	0.1 J (10)	NA	0.36 J (10)
BARIUM (ug/g)	8.45 (10)	14.55 (10)	7.49 (10)	NA	5.32 (10)
BERYLLIUM (ug/g)	0.04 J (10)	0.15 U (10)	0.1 U (10)	NA	0.1 U (10)
CADMIUM (ug/g)	0.19 (10)	0.17 (10)	0.25 (10)	NA	0.24 (10)
CHROMIUM (ug/g)	7.83 (10)	10.3 (10)	7.29 (10)	NA	3.03 (10)
COPPER (ug/g)	6.51 (10)	8.18 (10)	74.42 (10)	NA	6.29 (10)
IRON (ug/g)	79.1 (10)	125.03 (10)	224.76 (10)	NA	100.06 (10)
LEAD (ug/g)	0.58 J (10)	0.97 (10)	0.28 J (10)	NA	0.15 J (10)
MAGNESIUM (ug/g)	1191.99 (10)	1688.3 (10)	1480.89 (10)	NA	1100.73 (10)
MANGANESE (ug/g)	13.24 (10)	16.89 (10)	6.35 (10)	NA	7.62 (10)
MERCURY (ug/g)	0.2 J (10)	0.31 (10)	0.14 J (10)	NA	0.1 J (10)
NICKEL (ug/g)	0.56 J (10)	0.74 U (10)	0.52 U (10)	NA	0.09 J (10)
SELENIUM (ug/g)	0.7 J (10)	0.78 (10)	0.41 J (10)	NA	0.88 (10)
STRONTIUM (ug/g)	14.74 (10)	19.41 (10)	57 (10)	NA	19.23 (10)
VANADIUM (ug/g)	0.35 J (10)	1.07 (10)	0.89 (10)	NA	0.36 J (10)
ZINC (ug/g)	70.91 (10)	90.77 (10)	138.98 (10)	NA	140.87 (10)
ORGANIC					
PERCENT LIPIDS (GC) (%)	0.5 (10)	0.6 (10)	0.6 (10)	0.8 (10)	NA
PERCENT LIPIDS (GC/MS) (%)	0.5 (10)	0.6 (10)	0.6 (10)	0.8 (10)	NA
PERCENT LIPIDS (OTHER) (%)	0.5 (10)	0.6 (10)	0.6 (10)	0.8 (10)	3 (10)

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Appendix C

***RANA pipiens* Study 2000**
COC Test Results
Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	6	7	8	14	15
Field Sample ID	H3-TO10RP37-0-F009	H3-TO10RP37-0-F005	R3-F003(OFFAL)	H3-TO04RP32-1-F006	R1-F006(OFFAL)
Sample Location: Weston (Woodlot)	RP37 (EW-3)	RP37 (EW-3)	R3 Reference	RP32 (W-9A)	R1 Reference
Date Collected	05/05/2000	05/10/2000	05/18/2000	05/01/2000	04/28/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
PAHS					
1,6,7-TRIMETHYLNAPHTHALENE (ng/g)	0.6 J (10)	0.9 J (10)	0.5 J (10)	0.7 J (10)	NA
1-METHYLNAPHTHALENE (ng/g)	1.8 J (10)	2 J (10)	1 J (10)	2.2 J (10)	NA
1-METHYLPHENANTHRENE (ng/g)	1.5 J (10)	0.6 J (10)	2.9 (10)	0.7 J (10)	NA
2,6 DIMETHYLNAPHTHALENE (ng/g)	1.4 J (10)	1.4 J (10)	1.1 J (10)	1.4 J (10)	NA
2-METHYLNAPHTHALENE (ng/g)	2.9 J (10)	2.9 J (10)	1.7 J (10)	2.7 J (10)	NA
ACENAPHTHENE (ng/g)	0.6 J (10)	0.3 J (10)	1 J (10)	0.7 J (10)	NA
ACENAPHTHYLENE (ng/g)	0.4 J (10)	1.1 J (10)	0.5 J (10)	0.2 J (10)	NA
ANTHRACENE (ng/g)	0.5 J (10)	1 J (10)	0.3 J (10)	0.5 J (10)	NA
BENZO(A)ANTHRACENE (ng/g)	0.6 J (10)	1.3 J (10)	0.2 J (10)	0.4 J (10)	NA
BENZO(A)PYRENE (ng/g)	0.6 J (10)	1.4 J (10)	0.3 J (10)	0.4 J (10)	NA
BENZO(B)FLUORANTHENE (ng/g)	0.4 J (10)	2.1 J (10)	0.2 J (10)	0.3 J (10)	NA
BENZO(E)PYRENE (ng/g)	0.4 J (10)	1.1 J (10)	0.2 J (10)	0.2 J (10)	NA
BENZO(GHI)PERYLENE (ng/g)	0.3 J (10)	1.3 J (10)	0.2 J (10)	0.2 J (10)	NA
BENZO(K)FLUORANTHENE (ng/g)	0.2 J (10)	0.8 J (10)	0.1 J (10)	0.1 J (10)	NA
BIPHENYL (DIPHENYL) (ng/g)	3.7 J (10)	2.8 J (10)	1.9 J (10)	3.1 J (10)	NA
C1-CHRYSENE (ng/g)	1 J (10)	1 J (10)	5 U (10)	7.9 U (10)	NA
C1-DIBENZOTHIOPHENES (ng/g)	0.3 J (10)	0.2 J (10)	0.3 J (10)	0.2 J (10)	NA
C1-FLUORANTHENE & PYRENES (ng/g)	0.1 J (10)	1.3 J (10)	0.1 J (10)	0.3 J (10)	NA
C1-FLUORENE (ng/g)	2.3 J (10)	0.5 J (10)	3.9 J (10)	0.6 J (10)	NA
C1-NAPHTHALENES (ng/g)	4.6 J (10)	4.9 J (10)	2.7 J (10)	4.9 J (10)	NA
C1-PHENANTHRENE & ANTHRACENE (ng/g)	1.9 J (10)	1.8 J (10)	6.2 (10)	1.4 J (10)	NA
C2-CHRYSENE (ng/g)	0.3 J (10)	0.1 J (10)	0.1 J (10)	0.1 J (10)	NA
C2-DIBENZOTHIOPHENES (ng/g)	3.8 U (10)	0.1 J (10)	0.1 J (10)	0.1 J (10)	NA

Result Suffix Symbols:

R=Reject 0=Unvalidated

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J=Estimated 11=Completeness Check Complete

Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	6	7	8	14	15
Field Sample ID	H3-TO10RP37-0-F009	H3-TO10RP37-0-F005	R3-F003(OFFAL)	H3-TO04RP32-1-F006	R1-F006(OFFAL)
Sample Location: Weston (Woodlot)	RP37 (EW-3)	RP37 (EW-3)	R3 Reference	RP32 (W-9A)	R1 Reference
Date Collected	05/05/2000	05/10/2000	05/18/2000	05/01/2000	04/28/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
C2-FLUORENES (ng/g)	0.4 J (10)	0.2 J (10)	0.1 J (10)	0.7 J (10)	NA
C2-NAPHTHALENES (ng/g)	3.2 J (10)	3.5 J (10)	2.7 J (10)	3.4 J (10)	NA
C2-PHENANTHRENES & ANTHRACENES (ng/g)	0.4 J (10)	0.8 J (10)	4.3 U (10)	0.2 J (10)	NA
C3-CHRYSENES (ng/g)	8.8 U (10)	9 U (10)	5 U (10)	7.9 U (10)	NA
C3-DIBENZOTHIOPHENES (ng/g)	0.1 J (10)	0.1 J (10)	0.2 J (10)	3.4 U (10)	NA
C3-FLUORENES (ng/g)	0.3 J (10)	0.7 J (10)	0.5 J (10)	0.3 J (10)	NA
C3-NAPHTHALENES (ng/g)	1.1 J (10)	1.4 J (10)	0.6 J (10)	1.4 J (10)	NA
C3-PHENANTHRENES & ANTHRACENES (ng/g)	7.6 U (10)	0.3 J (10)	4.3 U (10)	6.8 U (10)	NA
C4-CHRYSENES (ng/g)	0.2 J (10)	9 U (10)	5 U (10)	0.1 J (10)	NA
C4-NAPHTHALENES (ng/g)	9.5 U (10)	9.6 U (10)	0.1 J (10)	0.1 J (10)	NA
C4-PHENANTHRENES & ANTHRACENES (ng/g)	0.1 J (10)	0.2 J (10)	0.1 J (10)	0.1 J (10)	NA
CHRYSENE (ng/g)	0.4 J (10)	1.9 J (10)	0.3 J (10)	1.1 J (10)	NA
DIBENZO(A,H)ANTHRACENE (ng/g)	0.3 J (10)	0.4 J (10)	0.1 J (10)	0.2 J (10)	NA
DIBENZOTHIOPHENE (ng/g)	0.3 J (10)	0.3 J (10)	0.2 J (10)	0.4 J (10)	NA
FLUORANTHENE (ng/g)	0.7 J (10)	2.6 J (10)	0.4 J (10)	0.6 J (10)	NA
FLUORENE (ng/g)	1.2 J (10)	2.2 J (10)	1 J (10)	1.8 J (10)	NA
INDENO(1,2,3-C,D)PYRENE (ng/g)	0.4 J (10)	1.3 J (10)	0.3 J (10)	0.2 J (10)	NA
NAPHTHALENE (ng/g)	6.7 J (10)	9.5 (10)	3.2 J (10)	7 (10)	NA
PERYLENE (ng/g)	0.1 J (10)	0.4 J (10)	0.3 J (10)	0.4 J (10)	NA
PHENANTHRENE (ng/g)	2.7 J (10)	2.6 J (10)	1.6 J (10)	2.4 J (10)	NA
PYRENE (ng/g)	0.8 J (10)	2.8 J (10)	0.5 J (10)	0.8 J (10)	NA
PAHS, Total (ng/g)	45.8	62.1	37.7	42.6	NA

Result Suffix Symbols:

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Appendix C

***RANA pipiens* Study 2000**
COC Test Results
Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	6	7	8	14	15
Field Sample ID	H3-TO10RP37-0-F009	H3-TO10RP37-0-F005	R3-F003(OFFAL)	H3-TO04RP32-1-F006	R1-F006(OFFAL)
Sample Location: Weston (Woodlot)	RP37 (EW-3)	RP37 (EW-3)	R3 Reference	RP32 (W-9A)	R1 Reference
Date Collected	05/05/2000	05/10/2000	05/18/2000	05/01/2000	04/28/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
PCB CONGENERES					
PCB-1 (ng/g)	0.0418 U (10)	0.119 (10)	1.036 (10)	0.0376 U (10)	NA
PCB-101/90 (ng/g)	1.37 (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-105 (ng/g)	16.212 (10)	4.776 (10)	0.147 (10)	14.418 (10)	NA
PCB-107 (ng/g)	0.79 (10)	0.0424 U (10)	0.0236 U (10)	0.378 (10)	NA
PCB-110 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-114 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-118 (ng/g)	64.477 (10)	20.725 (10)	0.0236 U (10)	65.983 (10)	NA
PCB-119 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-126 (ng/g)	0.046 (10)	0.015 J (10)	0.011 J (10)	0.014 J (10)	NA
PCB-128 (ng/g)	0.344 (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-129 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-130 (ng/g)	13.302 (10)	4.135 (10)	0.0236 U (10)	10.705 (10)	NA
PCB-135 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-136 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-138/160 (ng/g)	110.088 (10)	52.725 (10)	1.293 (10)	73.119 (10)	NA
PCB-141/179 (ng/g)	0.501 (10)	0.0424 U (10)	0.0236 U (10)	0.342 (10)	NA
PCB-146 (ng/g)	61.976 (10)	3.667 (10)	0.0236 U (10)	27.124 (10)	NA
PCB-149/123 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-15 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-151 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-153/132 (ng/g)	311.246 (10)	77.189 (10)	1.26 (10)	242.134 (10)	NA
PCB-156 (ng/g)	18.663 (10)	12.425 (10)	0.0236 U (10)	18.837 (10)	NA
PCB-158 (ng/g)	13.832 (10)	2.95 (10)	0.0236 U (10)	3.964 (10)	NA
PCB-16/32 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-166 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.196 (10)	1.943 (10)	NA
PCB-167 (ng/g)	23.107 (10)	15.697 (10)	0.0236 U (10)	19.77 (10)	NA
PCB-169 (ng/g)	0.059 (10)	0.052 (10)	0.0236 U (10)	0.014 J (10)	NA
PCB-170/190 (ng/g)	159.194 (10)	131.063 (10)	0.261 (10)	125.741 (10)	NA
PCB-171/202 (ng/g)	13.346 (10)	0.538 (10)	0.0236 U (10)	3.251 (10)	NA
PCB-172 (ng/g)	7.034 (10)	0.0424 U (10)	0.0236 U (10)	3.838 (10)	NA
PCB-174 (ng/g)	0.859 (10)	0.0424 U (10)	0.0236 U (10)	0.604 (10)	NA

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Appendix C

***RANA pipiens* Study 2000**
COC Test Results
Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	6	7	8	14	15
Field Sample ID	H3-TO10RP37-0-F009	H3-TO10RP37-0-F005	R3-F003(OFFAL)	H3-TO04RP32-1-F006	R1-F006(OFFAL)
Sample Location: Weston (Woodlot)	RP37 (EW-3)	RP37 (EW-3)	R3 Reference	RP32 (W-9A)	R1 Reference
Date Collected	05/05/2000	05/10/2000	05/18/2000	05/01/2000	04/28/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
PCB-175 (ng/g)	2.733 (10)	0.294 (10)	0.137 (10)	1.091 (10)	NA
PCB-176/137 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-177 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-178 (ng/g)	1.587 (10)	0.0424 U (10)	0.0236 U (10)	0.614 (10)	NA
PCB-18/17 (ng/g)	0.825 (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-180 (ng/g)	195.561 (10)	144.36 (10)	1.056 (10)	167.952 (10)	NA
PCB-183 (ng/g)	80.026 (10)	12.815 (10)	0.0236 U (10)	35.934 (10)	NA
PCB-185 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-187 (ng/g)	141.952 (10)	12.14 (10)	0.318 (10)	154.005 (10)	NA
PCB-189 (ng/g)	5.701 (10)	5.562 (10)	0.0236 U (10)	5.767 (10)	NA
PCB-191 (ng/g)	8.974 (10)	4.886 (10)	0.0236 U (10)	3.866 (10)	NA
PCB-193 (ng/g)	30.166 (10)	0.0424 U (10)	0.0236 U (10)	14.715 (10)	NA
PCB-194 (ng/g)	71.261 (10)	82.37 (10)	0.169 (10)	67.485 (10)	NA
PCB-195/208 (ng/g)	32.581 (10)	24.498 (10)	13.202 (10)	23.824 (10)	NA
PCB-197 (ng/g)	0.941 (10)	0.0424 U (10)	0.0236 U (10)	0.472 (10)	NA
PCB-199 (ng/g)	35.994 (10)	2.15 (10)	0.0236 U (10)	18.732 (10)	NA
PCB-200 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-201/157/173 (ng/g)	0.891 (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-203/196 (ng/g)	86.143 (10)	71.305 (10)	0.0236 U (10)	64.702 (10)	NA
PCB-205 (ng/g)	5.277 (10)	5.318 (10)	0.0236 U (10)	4.326 (10)	NA
PCB-206 (ng/g)	11.119 (10)	11.149 (10)	0.0236 U (10)	10.44 (10)	NA
PCB-207 (ng/g)	1.218 (10)	0.915 (10)	0.272 (10)	1.155 (10)	NA
PCB-209 (ng/g)	1.351 (10)	1.362 (10)	0.438 (10)	1.489 (10)	NA
PCB-22/51 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-24/27 (ng/g)	2.402 (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-25 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-26 (ng/g)	101.295 (10)	1.861 (10)	0.8 (10)	7.605 (10)	NA
PCB-28 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-29 (ng/g)	11.616 (10)	0.0424 U (10)	0.0236 U (10)	1.063 (10)	NA
PCB-30 (ng/g)	0.854 (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-31 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-33/20 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.501 (10)	0.0376 U (10)	NA

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Appendix C

***RANA pipiens* Study 2000**
COC Test Results
Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	6	7	8	14	15
Field Sample ID	H3-TO10RP37-0-F009	H3-TO10RP37-0-F005	R3-F003(OFFAL)	H3-TO04RP32-1-F006	R1-F006(OFFAL)
Sample Location: Weston (Woodlot)	RP37 (EW-3)	RP37 (EW-3)	R3 Reference	RP32 (W-9A)	R1 Reference
Date Collected	05/05/2000	05/10/2000	05/18/2000	05/01/2000	04/28/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
PCB-39 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-40 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-41/64 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-42/59/37 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-44 (ng/g)	0.0418 U (10)	0.618 (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-45 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-46 (ng/g)	3.375 (10)	0.0424 U (10)	0.0236 U (10)	0.31 (10)	NA
PCB-47/75 (ng/g)	7.299 (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-48 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-49 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-52 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-53 (ng/g)	0.598 (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-56/60 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-63 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-66 (ng/g)	0.113 (10)	1.562 (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-67 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-69 (ng/g)	0.443 (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-7/9 (ng/g)	1.286 (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-70 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-72 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-74/61 (ng/g)	1.314 (10)	0.0424 U (10)	0.0236 U (10)	0.457 (10)	NA
PCB-77 (ng/g)	0.119 (10)	0.0424 U (10)	0.007 J (10)	0.116 (10)	NA
PCB-8/5 (ng/g)	0.799 (10)	0.0424 U (10)	32.258 I (10)	0.0376 U (10)	NA
PCB-81 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.005 J (10)	0.08 (10)	NA
PCB-82 (ng/g)	1.101 (10)	0.0424 U (10)	1.622 (10)	0.0376 U (10)	NA
PCB-83 (ng/g)	43.875 (10)	0.58 (10)	0.36 (10)	1.943 (10)	NA
PCB-84 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-85 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-87/115 (ng/g)	0.519 (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-91/55 (ng/g)	0.0418 U (10)	0.584 (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-92 (ng/g)	0.0418 U (10)	0.0424 U (10)	0.0236 U (10)	0.0376 U (10)	NA
PCB-95/80 (ng/g)	6.824 (10)	0.0424 U (10)	0.616 (10)	1.575 (10)	NA

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Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002546	RFW0002546	RFW0002546	RFW0002546	RFW0002546
C-of-C Item	6	7	8	14	15
Field Sample ID	H3-TO10RP37-0-F009	H3-TO10RP37-0-F005	R3-F003(OFFAL)	H3-TO04RP32-1-F006	R1-F006(OFFAL)
Sample Location: Weston (Woodlot)	RP37 (EW-3)	RP37 (EW-3)	R3 Reference	RP32 (W-9A)	R1 Reference
Date Collected	05/05/2000	05/10/2000	05/18/2000	05/01/2000	04/28/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
PCB-97 (ng/g)	0.0418 U (10)	0.0424 U (10)	2.188 (10)	0.0376 U (10)	NA
PCB-99 (ng/g)	48.523 (10)	4.305 (10)	0.0236 U (10)	16.98 (10)	NA
TOTAL DCB (ng/g)	1.4 J (10)	1.4 J (10)	0.4 J (10)	1.5 J (10)	NA
TOTAL DICB (ng/g)	2.1 J (10)	42.4 U (10)	23.6 U (10)	37.6 U (10)	NA
TOTAL HPCB (ng/g)	647.1 (10)	311.7 (10)	1.8 J (10)	517.4 (10)	NA
TOTAL HXCB (ng/g)	553.1 (10)	168.8 (10)	2.9 J (10)	398.4 (10)	NA
TOTAL MCB (ng/g)	41.8 U (10)	0.1 J (10)	1 J (10)	37.6 U (10)	NA
TOTAL NCB (ng/g)	12.3 J (10)	12.1 J (10)	0.3 J (10)	11.6 J (10)	NA
TOTAL OCB (ng/g)	233.1 (10)	185.6 (10)	13.4 J (10)	179.5 (10)	NA
TOTAL PCB (ng/g)	183.7 (10)	30.4 J (10)	4.9 J (10)	101.3 (10)	NA
TOTAL TCB (ng/g)	17 J (10)	3.5 J (10)	23.6 U (10)	3.8 J (10)	NA
TOTAL TRICB (ng/g)	117 (10)	1.9 J (10)	1.3 J (10)	8.7 J (10)	NA
PCBS					
AROCLOR-1242 (ng/g)	41.8 U (10)	42.4 U (10)	23.6 U (10)	37.6 U (10)	NA
AROCLOR-1248 (ng/g)	41.8 U (10)	42.4 U (10)	23.6 U (10)	37.6 U (10)	NA
AROCLOR-1254 (ng/g)	41.8 U (10)	42.4 U (10)	23.6 U (10)	37.6 U (10)	NA
AROCLOR-1260 (ng/g)	1766.8 (10)	715.4 (10)	23.6 U (10)	1222.1 (10)	NA
PCB, TOTAL (ng/g)	1766.8	715.4	26	1222.1	NA

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002542	RFW0002542	RFW0002542	RFW0002542	RFW0002542
C-of-C Item	1	2	3	4	5
Field Sample ID	R3-F001(OVARY)	R3-F002(OVARY)	R3-F003(OVARY)	R3-F002(OFFAL)	R3-F001(OFFAL)
Sample Location: Weston (Woodlot)	R3 Reference	R3 Reference	R3 Reference	R3 Reference	R3 Reference
Date Collected	05/18/2000	05/18/2000	05/18/2000	05/18/2000	05/18/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
ORGANIC					
PERCENT LIPIDS (GC) (%)	6.3 (11)	6.7 (11)	8.2 (11)	0.7 (11)	0.4 (11)
PCBS					
AROCLOR-1242 (ng/g)	44.2 U (11)	46.7 U (11)	44.1 U (11)	35.8 U (11)	37.2 U (11)
AROCLOR-1248 (ng/g)	44.2 U (11)	46.7 U (11)	44.1 U (11)	35.8 U (11)	37.2 U (11)
AROCLOR-1254 (ng/g)	44.2 U (11)	46.7 U (11)	44.1 U (11)	35.8 U (11)	37.2 U (11)
AROCLOR-1260 (ng/g)	44.2 U (11)	46.7 U (11)	44.1 U (11)	35.8 U (11)	37.2 U (11)
PCB, TOTAL (ng/g)	21.9	24.1	27	12.7	6

Field Sample ID Symbols:

R=Reference Specimen

F=Female

EM=Egg Mass, Phase I

MM=Metamorph, Phase I

MC=Metamorph, Crossover Study, Phase I

TP=Tadpole Larvae, Phase II

C=Metamorph Composite, Phase III

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002542	RFW0002542	RFW0002542	RFW0002542	RFW0002542
C-of-C Item	6	7	8	11	12
Field Sample ID	R3-C001	H3-TA08RP34-0-EM01	H3-TA12RP39-0-EM01	H3-TV08RP34-0-F005	H3-TV08RP34-0-F006
Sample Location: Weston (Woodlot)	R3 Reference	RP34 (W-7A)	RP39 (W-1)	RP34 (W-7A)	RP34 (W-7A)
Date Collected	05/18/2000	05/22/2000	05/23/2000	04/03/2000	04/03/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
ORGANIC					
PERCENT LIPIDS (GC) (%)	1.6 (11)	0.1 (11)	0.1 U (11)	7 (11)	5.8 (11)
PCBS					
AROCLOR-1242 (ng/g)	48.8 U (11)	175.4 U (11)	400 U (11)	45.9 U (11)	42.2 U (11)
AROCLOR-1248 (ng/g)	48.8 U (11)	175.4 U (11)	400 U (11)	45.9 U (11)	42.2 U (11)
AROCLOR-1254 (ng/g)	48.8 U (11)	175.4 U (11)	400 U (11)	45.9 U (11)	42.2 U (11)
AROCLOR-1260 (ng/g)	48.8 U (11)	1104.8 (11)	400 U (11)	1631.9 (11)	26806.4 (11)
PCB, TOTAL (ng/g)	13.6	1104.8	49.2	1631.9	26806.4

Field Sample ID Symbols:

R=Reference Specimen

F=Female

EM=Egg Mass, Phase I

MM=Metamorph, Phase I

MC=Metamorph, Crossover Study, Phase I

TP=Tadpole Larvae, Phase II

C=Metamorph Composite, Phase III

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002542	RFW0002542	RFW0002542	RFW0002545	RFW0002545
C-of-C Item	13	14	21	7	16
Field Sample ID	H3-TO08RP34-0-F006	H3-TA08RP34-0-C001	H3-TV08RP34-1-F006	H3-TA12RP39-0-C001	R2-F009(OVARY)
Sample Location: Weston (Woodlot)	RP34 (W-7A)	RP34 (W-7A)	RP34 (W-7A)	RP39 (W-1)	R2 Reference
Date Collected	04/03/2000	04/03/2000	04/03/2000	04/19/2000	04/26/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
ORGANIC					
PERCENT LIPIDS (GC) (%)	0.3 (11)	1.9 (11)	5.7 (11)	0.4 (11)	3.6 (11)
PCBS					
AROCLOR-1242 (ng/g)	43.5 U (11)	46.3 U (11)	40.3 U (11)	32.4 U (11)	41.5 U (11)
AROCLOR-1248 (ng/g)	43.5 U (11)	46.3 U (11)	40.3 U (11)	32.4 U (11)	41.5 U (11)
AROCLOR-1254 (ng/g)	43.5 U (11)	46.3 U (11)	40.3 U (11)	32.4 U (11)	41.5 U (11)
AROCLOR-1260 (ng/g)	2562.5 (11)	2113.8 (11)	23876.1 (11)	154.4 (11)	41.5 U (11)
PCB, TOTAL (ng/g)	2562.5	2113.8	23876.1	154.4	7.8

Field Sample ID Symbols:

R=Reference Specimen

F=Female

EM=Egg Mass, Phase I

MM=Metamorph, Phase I

MC=Metamorph, Crossover Study, Phase I

TP=Tadpole Larvae, Phase II

C=Metamorph Composite, Phase III

Result Suffix Symbols:

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Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002545	RFW0002545	RFW0002545	RFW0002545	RFW0002548
C-of-C Item	17	18	19	20	4
Field Sample ID	R2-F012(OVARY)	R2-F012(OFFAL)	R1-F001(OFFAL)	H3-TA12RP39-1-C001	R4-EM01-00-C1
Sample Location: Weston (Woodlot)	R2 Reference	R2 Reference	R1 Reference	RP39 (W-1)	R4 Reference
Date Collected	04/26/2000	04/26/2000	04/28/2000	04/19/2000	11/13/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
ORGANIC					
PERCENT LIPIDS (GC) (%)	11.2 (11)	0.4 (11)	0.5 (11)	0.5 (11)	0.58 (11)
PCBS					
AROCLOR-1242 (ng/g)	58.1 U (11)	39.2 U (11)	39.7 U (11)	48.3 U (11)	303 U (11)
AROCLOR-1248 (ng/g)	58.1 U (11)	39.2 U (11)	39.7 U (11)	48.3 U (11)	303 U (11)
AROCLOR-1254 (ng/g)	58.1 U (11)	39.2 U (11)	39.7 U (11)	48.3 U (11)	303 U (11)
AROCLOR-1260 (ng/g)	58.1 U (11)	39.2 U (11)	39.7 U (11)	48.3 U (11)	303 U (11)
PCB, TOTAL (ng/g)	14.9	1.2	2	171.3	3.5

Field Sample ID Symbols:

R=Reference Specimen

F=Female

EM=Egg Mass, Phase I

MM=Metamorph, Phase I

MC=Metamorph, Crossover Study, Phase I

TP=Tadpole Larvae, Phase II

C=Metamorph Composite, Phase III

Result Suffix Symbols:

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Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002548	RFW0002548	RFW0002550	RFW0002550	RFW0002550
C-of-C Item	5	6	1	3	4
Field Sample ID	R4-EM01-40-E1	R4-EM01-40-S1	R2-C001	R1-F001-00-C1	R1-F001-00-C2
Sample Location: Weston (Woodlot)	R4 Reference	R4 Reference	R2 Reference	R1 Reference	R1 Reference
Date Collected	11/13/2000	11/13/2000	04/26/2000	04/28/2000	04/28/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
ORGANIC					
PERCENT LIPIDS (GC) (%)	0.3 (11)	0.4 (11)	1.8 (11)	0.1 U (11)	2.6 (11)
PCBS					
AROCLOR-1242 (ng/g)	178.6 U (11)	135.1 U (11)	34 U (11)	119 U (11)	270.3 U (11)
AROCLOR-1248 (ng/g)	178.6 U (11)	135.1 U (11)	34 U (11)	119 U (11)	270.3 U (11)
AROCLOR-1254 (ng/g)	178.6 U (11)	110.2 J (11)	34 U (11)	119 U (11)	270.3 U (11)
AROCLOR-1260 (ng/g)	178.6 U (11)	440.8 (11)	34 U (11)	119 U (11)	270.3 U (11)
PCB, TOTAL (ng/g)	6.5	551	28	42.1	67.6

Field Sample ID Symbols:

R=Reference Specimen

F=Female

EM=Egg Mass, Phase I

MM=Metamorph, Phase I

MC=Metamorph, Crossover Study, Phase I

TP=Tadpole Larvae, Phase II

C=Metamorph Composite, Phase III

Result Suffix Symbols:

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Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002550	RFW0002550	RFW0002550	RFW0002550	RFW0002550
C-of-C Item	5	6	7	8	9
Field Sample ID	R1-F001-33-E1	R1-F001(OVARY)	R1-F006(OVARY)	R1-C001	H3-TA04RP33-0-C001
Sample Location: Weston (Woodlot)	R1 Reference	R1 Reference	R1 Reference	R1 Reference	RP33 (W-8)
Date Collected	04/28/2000	04/28/2000	04/28/2000	04/28/2000	04/30/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
ORGANIC					
PERCENT LIPIDS (GC) (%)	0.1 U (11)	2.2 (11)	1.2 (11)	1.6 (11)	1.6 (11)
PCBS					
AROCLOR-1242 (ng/g)	476.2 U (11)	43.5 U (11)	133.3 U (11)	41.5 U (11)	34.7 U (11)
AROCLOR-1248 (ng/g)	476.2 U (11)	43.5 U (11)	133.3 U (11)	41.5 U (11)	34.7 U (11)
AROCLOR-1254 (ng/g)	37.3 J (11)	43.5 U (11)	133.3 U (11)	41.5 U (11)	34.7 U (11)
AROCLOR-1260 (ng/g)	335.8 J (11)	43.5 U (11)	133.3 U (11)	41.5 U (11)	5387.6 (11)
PCB, TOTAL (ng/g)	373.1	31.2	40.9	35.5	5387.6

Field Sample ID Symbols:

R=Reference Specimen

F=Female

EM=Egg Mass, Phase I

MM=Metamorph, Phase I

MC=Metamorph, Crossover Study, Phase I

TP=Tadpole Larvae, Phase II

C=Metamorph Composite, Phase III

Result Suffix Symbols:

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Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002550	RFW0002550	RFW0002550	RFW0002550	RFW0002550
C-of-C Item	10	11	12	13	14
Field Sample ID	H3-TV04RP32-0-F003	H3-TV04RP32-0-F006	H3-TO04RP32-0-F003	H3-TA04RP32-0-C001	H3-TA10RP37-0-C001
Sample Location: Weston (Woodlot)	RP32 (W-9A)	RP32 (W-9A)	RP32 (W-9A)	RP32 (W-9A)	RP37 (EW-3)
Date Collected	05/01/2000	05/01/2000	05/01/2000	05/01/2000	05/01/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
ORGANIC					
PERCENT LIPIDS (GC) (%)	35.7 (11)	0.1 U (11)	1.7 (11)	1.6 (11)	1.7 (11)
PCBS					
AROCLOR-1242 (ng/g)	196.1 U (11)	303 U (11)	41 U (11)	26.7 U (11)	30.8 U (11)
AROCLOR-1248 (ng/g)	196.1 U (11)	28.3 J (11)	41 U (11)	26.7 U (11)	30.8 U (11)
AROCLOR-1254 (ng/g)	196.1 U (11)	303 U (11)	41 U (11)	26.7 U (11)	30.8 U (11)
AROCLOR-1260 (ng/g)	45085.9 (11)	536.8 (11)	1259.5 (11)	3586.9 (11)	4264.8 (11)
PCB, TOTAL (ng/g)	45085.9	565	1259.5	3586.9	4264.8

Field Sample ID Symbols:

R=Reference Specimen

F=Female

EM=Egg Mass, Phase I

MM=Metamorph, Phase I

MC=Metamorph, Crossover Study, Phase I

TP=Tadpole Larvae, Phase II

C=Metamorph Composite, Phase III

Result Suffix Symbols:

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Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002550	RFW0002550	RFW0002550	RFW0002550	RFW0002551
C-of-C Item	15	16	17	20	1
Field Sample ID	H3-TV08RP35-0-F003	H3-TA08RP35-0-C001	H3-TA10RP36-0-C001	H3-TO04RP32-1-F003	H3-TO08RP35-0-F003
Sample Location: Weston (Woodlot)	RP35 (W-6)	RP35 (W-6)	RP36 (W-4)	RP32 (W-9A)	RP35 (W-6)
Date Collected	05/02/2000	05/03/2000	05/05/2000	05/01/2000	05/02/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
ORGANIC					
PERCENT LIPIDS (GC) (%)	25 (11)	1.3 (11)	1 (11)	1.6 (11)	0.8 (11)
PCBS					
AROCLOR-1242 (ng/g)	51 U (11)	35 U (11)	42.7 U (11)	45.7 U (11)	42 U (11)
AROCLOR-1248 (ng/g)	51 U (11)	35 U (11)	42.7 U (11)	45.7 U (11)	42 U (11)
AROCLOR-1254 (ng/g)	51 U (11)	35 U (11)	42.7 U (11)	45.7 U (11)	42 U (11)
AROCLOR-1260 (ng/g)	9477.1 (11)	1755.3 (11)	343.3 (11)	1500.1 (11)	386.4 (11)
PCB, TOTAL (ng/g)	9477.1	1755.3	343.3	1500.1	386.4

Field Sample ID Symbols:

R=Reference Specimen

F=Female

EM=Egg Mass, Phase I

MM=Metamorph, Phase I

MC=Metamorph, Crossover Study, Phase I

TP=Tadpole Larvae, Phase II

C=Metamorph Composite, Phase III

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

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Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002551	RFW0002551	RFW0002551	RFW0002551	RFW0002551
C-of-C Item	2	3	4	5	6
Field Sample ID	H3-TA12RP38-0-C001	H3-TV12RP39-0-F001	H3-TV12RP39-0-F008	H3-TO12RP39-0-F008	H3-TV10RP37-0-F009
Sample Location: Weston (Woodlot)	RP38 (E-1)	RP39 (W-1)	RP39 (W-1)	RP39 (W-1)	RP37 (EW-3)
Date Collected	05/02/2000	05/03/2000	05/04/2000	05/04/2000	05/05/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
ORGANIC					
PERCENT LIPIDS (GC) (%)	1.3 (11)	14.1 (11)	1.6 (11)	0.7 (11)	0.4 (11)
PCBS					
AROCLOR-1242 (ng/g)	38.5 U (11)	46.1 U (11)	1428.6 U (11)	37.3 U (11)	555.6 U (11)
AROCLOR-1248 (ng/g)	38.5 U (11)	46.1 U (11)	1428.6 U (11)	37.3 U (11)	555.6 U (11)
AROCLOR-1254 (ng/g)	38.5 U (11)	46.1 U (11)	1428.6 U (11)	37.3 U (11)	555.6 U (11)
AROCLOR-1260 (ng/g)	3085.4 (11)	240.4 (11)	290.9 J (11)	37.3 U (11)	5612.7 (11)
PCB, TOTAL (ng/g)	3085.4	240.4	290.9	25	5612.7

Field Sample ID Symbols:

R=Reference Specimen

F=Female

EM=Egg Mass, Phase I

MM=Metamorph, Phase I

MC=Metamorph, Crossover Study, Phase I

TP=Tadpole Larvae, Phase II

C=Metamorph Composite, Phase III

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002551	RFW0002551	RFW0002551	RFW0002551	RFW0002551
C-of-C Item	7	8	10	11	12
Field Sample ID	H3-TA08RP35-0-TP01	H3-TA10RP36-0-EM02	H3-TA10RP37-0-TP01	H3-TV10RP37-0-F005	H3-TA03RP31-0-F001
Sample Location: Weston (Woodlot)	RP35 (W-6)	RP36 (W-4)	RP37 (EW-3)	RP37 (EW-3)	RP31 (E-5)
Date Collected	05/08/2000	05/08/2000	05/09/2000	05/10/2000	05/10/2000
Depth	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0
Source	EPA COE	EPA COE	EPA COE	EPA COE	EPA COE
Analyte					
ORGANIC					
PERCENT LIPIDS (GC) (%)	0.1 (11)	1.7 (11)	2.9 (11)	0.4 (11)	0.6 (11)
PCBS					
AROCLOR-1242 (ng/g)	232.6 U (11)	1111.1 U (11)	125 U (11)	588.2 U (11)	40 U (11)
AROCLOR-1248 (ng/g)	232.6 U (11)	1111.1 U (11)	47.9 J (11)	588.2 U (11)	40 U (11)
AROCLOR-1254 (ng/g)	232.6 U (11)	1111.1 U (11)	479.5 (11)	588.2 U (11)	40 U (11)
AROCLOR-1260 (ng/g)	675.8 (11)	1429.8 (11)	431.5 (11)	415.4 J (11)	1308.2 (11)
PCB, TOTAL (ng/g)	675.8	1429.8	959	415.4	1308.2

Field Sample ID Symbols:

R=Reference Specimen

F=Female

EM=Egg Mass, Phase I

MM=Metamorph, Phase I

MC=Metamorph, Crossover Study, Phase I

TP=Tadpole Larvae, Phase II

C=Metamorph Composite, Phase III

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix C

RANA pipiens Study 2000 COC Test Results Tissue Samples

C-of-C ID	RFW0002551
C-of-C Item	19
Field Sample ID	H3-TA03RP31-1-F001
Sample Location: Weston (Woodlot)	RP31 (E-5)
Date Collected	05/10/2000
Depth	0.0-0.0
Source	EPA COE
Analyte	
ORGANIC	
PERCENT LIPIDS (GC) (%)	0.5 (11)
PCBS	
AROCLOR-1242 (ng/g)	42.4 U (11)
AROCLOR-1248 (ng/g)	42.4 U (11)
AROCLOR-1254 (ng/g)	42.4 U (11)
AROCLOR-1260 (ng/g)	1161.1 (11)
PCB, TOTAL (ng/g)	1161.1

Field Sample ID Symbols:

R=Reference Specimen

F=Female

EM=Egg Mass, Phase I

MM=Metamorph, Phase I

MC=Metamorph, Crossover Study, Phase I

TP=Tadpole Larvae, Phase II

C=Metamorph Composite, Phase III

Result Suffix Symbols:

R=Reject 0=Unvalidated

U=Undetected 10=Validated

J=Estimated 11=Completeness Check Complete

Appendix D

Reproductive Specimens Inventory List

Reproductive Data:

Female Assessment

Male Assessment

Correlation Plots

**HOUSATONIC RIVER PROJECT
RANA *pipiens* REPRODUCTIVE STUDY 2000
SAMPLE TRACKING INVENTORY
SITE E-5 (TARGET LOCATION 31)**

Weston Sample ID	C-of-C No.	Sample Date	Female Count and Assessment			Male Count and Assessment		
			Adult	Juvenile	Artificial Fert.	Adult	Juvenile	Artificial Fert.
H3TA03RP31-0-F001	2065	3/24/2000		1				
H3TA03RP31-0-F002	2187	4/21/2000	1					
COLUMN TOTALS:			1	1	0	0	0	0

HOUSATONIC RIVER PROJECT
***RANA pipiens* REPRODUCTIVE STUDY 2000**
SAMPLE TRACKING INVENTORY
SITE W-9a (TARGET LOCATION 32)

Weston Sample ID	C-of-C No.	Sample Date	Female Count and Assessment			Male Count and Assessment		
			Adult	Juvenile	Artificial Fert.	Adult	Juvenile	Artificial Fert.
H3TA04RP32-0-F001	2066	3/25/2000	1		1			
H3TA04RP32-0-F002	2066	3/25/2000	1					
H3TA04RP32-0-F003	2066	3/25/2000	1					
H3TA04RP32-0-F005	2066	3/25/2000	1					
H3TA04RP32-0-F006	2066	3/26/2000		1				
H3TA04RP32-0-F007	2097	4/3/2000	1		1			
H3TA04RP32-0-M001	2066	3/25/2000				1		1
H3TA04RP32-0-M002	2066	3/26/2000				1		1
H3TA04RP32-0-M003	2066	3/26/2000				1		1
H3TA04RP32-0-M004	2066	3/26/2000				1		1
H3TA04RP32-0-M005	2066	3/26/2000				1		
H3TA04RP32-0-M006	2066	3/26/2000				1		
H3TA04RP32-0-M007	2066	3/25/2000				1		
COLUMN TOTALS:			5	1	2	7	0	4

HOUSATONIC RIVER PROJECT
***RANA pipiens* REPRODUCTIVE STUDY 2000**
SAMPLE TRACKING INVENTORY
SITE W-8 (TARGET LOCATION 33)

[illegible]

**HOUSATONIC RIVER PROJECT
RANA *pipiens* REPRODUCTIVE STUDY 2000
SAMPLE TRACKING INVENTORY
SITE W-7a (TARGET LOCATION 34)**

Weston Sample ID	C-of-C No.	Sample Date	Female Count and Assessment			Male Count and Assessment		
			Adult	Juvenile	Artificial Fert.	Adult	Juvenile	Artificial Fert.
H3TA08RP34-0-F001	2067	3/25/2000	1		1			
H3TA08RP34-0-F002	2067	3/26/2000	1		1			
H3TA08RP34-0-F003	2067	3/26/2000	1		1			
H3TA08RP34-0-F004	2067	3/26/2000	1					
H3TA08RP34-0-F005	2067	3/26/2000	1		1			
H3TA08RP34-0-F006	2067	3/26/2000	1		1			
H3TA08PR34-0-F007	2186	4/21/2000	1					
H3TA08RP34-0-M001	2067	3/25/2000				1		1
H3TA08RP34-0-M002	2067	3/26/2000				1		1
H3TA08RP34-0-M003	2077	3/28/2000				1		1
H3TA08RP34-0-M004	2077	3/28/2000				1		1
H3TA08RP34-0-M005	2077	3/28/2000				1		
COLUMN TOTALS:			7	0	5	5	0	4

**HOUSATONIC RIVER PROJECT
RANA *pipiens* REPRODUCTIVE STUDY 2000
SAMPLE TRACKING INVENTORY
SITE W-6 (TARGET LOCATION 35)**

Weston Sample ID	C-of-C No.	Sample Date	Female Count and Assessment			Male Count and Assessment		
			Adult	Juvenile	Artificial Fert.	Adult	Juvenile	Artificial Fert.
H3TA08RP35-0-F001	2069	3/26/2000	1		1			
H3TA08RP35-0-F002	2069	3/26/2000	1		1			
H3TA08RP35-0-F003	2069	3/26/2000	1					
H3TA08RP35-0-F004	2069	3/26/2000	1		1			
H3TA08RP35-0-F005	2069	3/26/2000	1					
H3TA08RP35-0-F006	2076	3/28/2000	1					
H3TA08RP35-0-F007	2076	3/28/2000	1					
H3TA08RP35-0-M001	2069	3/25/2000				1		1
H3TA08RP35-0-M002	2069	3/25/2000				1		1
H3TA08RP35-0-M003	2069	3/25/2000				1		1
H3TA08RP35-0-M004	2069	3/25/2000				1		1
H3TA08RP35-0-M005	2069	3/26/2000				1		
H3TA08RP35-0-M006	2069	3/26/2000				1		
COLUMN TOTALS:			7	0	3	6	0	4

**HOUSATONIC RIVER PROJECT
RANA *pipiens* REPRODUCTIVE STUDY 2000
SAMPLE TRACKING INVENTORY
SITE W-4 (TARGET LOCATION 36)**

Weston Sample ID	C-of-C No.	Sample Date	Female Count and Assessment			Male Count and Assessment		
			Adult	Juvenile	Artificial Fert.	Adult	Juvenile	Artificial Fert.
H3TA10RP36-0-F001	2068	3/25/2000	1		1			
H3TA10RP36-0-F002	2068	3/26/2000	1		1			
H3TA10RP36-0-F003	2068	3/26/2000	1					
H3TA10RP36-0-F005	2172	4/16/2000	1					
H3TA10RP36-0-M001	2068	3/26/2000				1		
H3TA10RP36-0-M002	2068	3/26/2000				1		
H3TA10RP36-0-M003	2118	4/4/2000				1		
H3TA10RP36-0-M004	2144	4/13/2000				1		1
H3TA10RP36-0-M005	2075	3/28/2000				1		
COLUMN TOTALS:			4	0	2	5	0	1

Appendix D

**HOUSATONIC RIVER PROJECT
RANA *pipiens* REPRODUCTIVE STUDY 2000
SAMPLE TRACKING INVENTORY
SITE EW-3 (TARGET LOCATION 37)**

[illegible]

**HOUSATONIC RIVER PROJECT
RANA *pipiens* REPRODUCTIVE STUDY 2000
SAMPLE TRACKING INVENTORY
SITE E-1 (TARGET LOCATION 38)**

Weston Sample ID	C-of-C No.	Sample Date	Female Count and Assessment			Male Count and Assessment		
			Adult	Juvenile	Artificial Fert.	Adult	Juvenile	Artificial Fert.
H3TA12RP38-0-F001	2063	03/24/00	1		1			
H3TA12RP38-0-F002	2071	03/26/00	1		1			
H3TA12RP38-0-F003	2071	03/26/00	1					
H3TA12RP38-0-F004	2071	03/26/00	1					
H3TA12RP38-0-F005	2092	03/30/00	1					
H3TA12RP38-0-F007	2117	04/04/00	1		1			
H3TA12RP38-0-M001	2063	03/24/00				1		1
H3TA12RP38-0-M002	2063	03/24/00				1		1
H3TA12RP38-0-M003	2071	03/26/00				1		1
H3TA12RP38-0-M004	2071	03/26/00				1		
H3TA12RP38-0-M005	2071	03/26/00				1		
H3TA12RP38-0-M006	2071	03/27/00				1		
H3TA12RP38-0-M007	2079	03/29/00				1		1
H3TA12RP38-0-M008	2101	4/3/2000				1		
COLUMN TOTALS:			6	0	3	8	0	4

Appendix D

HOUSATONIC RIVER PROJECT
***RANA pipiens* REPRODUCTIVE STUDY 2000**
SAMPLE TRACKING INVENTORY
SITE W-1 (TARGET LOCATION 39)

Weston Sample ID	C-of-C No.	Sample Date	Female Count and Assessment			Male Count and Assessment		
			Adult	Juvenile	Artificial Fert.	Adult	Juvenile	Artificial Fert.
H3TA12RP39-0-F001	2070	3/26/2000	1		1			
H3TA12RP39-0-F002	2070	3/26/2000	1		1			
H3TA12RP39-0-F003	2098	4/3/2000	1					
H3TA12RP39-0-F004	2113	4/4/2000	1					
H3TA12RP39-0-F005	2114	4/4/2000	1					
H3TA12RP39-0-F006	2115	4/4/2000	1					
H3TA12RP39-0-F007	2143	4/11/2000		1				
H3TA12RP39-0-F008	2143	4/11/2000		1				
H3TA12RP39-0-F009	2183	4/20/2000	1					
H3TA12RP39-0-F010	2185	4/21/2000	1					
H3TA12RP39-0-M001	2070	3/25/2000				1		
H3TA12RP39-0-M002	2070	3/26/2000				1		1
H3TA12RP39-0-M003	2070	3/26/2000				1		1
H3TA12RP39-0-M004	2070	3/26/2000				1		1
H3TA12RP39-0-M005	2070	3/26/2000				1		
H3TA12RP39-0-M006	2070	3/26/2000				1		1
H3TA12RP39-0-M007	2143	4/11/2000				1		
COLUMN TOTALS:			8	2	2	7	0	4

HOUSATONIC RIVER PROJECT
***RANA pipiens* REPRODUCTIVE STUDY 2000**
SAMPLE TRACKING INVENTORY
EXTERNAL REFERENCES R1, R2, AND R3

FEL Sample ID	Date Received From Carolina Biological Supply	Female Count and Assessment			Male Count and Assessment		
		Adult	Juvenile	Artificial Fert.	Adult	Juvenile	Artificial Fert.
R1-07574-001-F001	4/26/2000	1		1			
R1-07574-002-F002	4/26/2000	1					
R1-07574-003-F003	4/26/2000	1		1			
R1-07574-004-F004	4/26/2000	1					
R1-07574-005-F005	4/26/2000	1		1			
R1-07574-006-F006	4/26/2000	1					
R2-07574-007-F007	4/26/2000	1					
R2-07574-008-F008	4/26/2000	1					
R2-07574-009-F009	4/26/2000	1		1			
R2-07574-010-F010	4/26/2000	1		1			
R2-07574-011-F011	4/26/2000	1		1			
R2-07574-012-F012	4/26/2000	1		1			
R1-07574-013-M001	4/26/2000				1		1
R1-07574-014-M002	4/26/2000				1		
R1-07574-015-M003	4/26/2000				1		
R1-07574-016-M004	4/26/2000				1		1
R1-07574-017-M005	4/26/2000				1		1
R1-07574-018-M006	4/26/2000				1		1
R2-07574-019-M007	4/26/2000				1		
R2-07574-020-M008	4/26/2000				1		
R2-07574-021-M009	4/26/2000				1		1
R2-07574-022-M010	4/26/2000				1		1
R2-07574-023-M011	4/26/2000				1		1
R2-07574-024-M012	4/26/2000				1		1
R3-07641-001-F001	5/17/2000	1		1			
R3-07641-002-F002	5/17/2000	1		1			
R3-07641-003-F003	5/17/2000	1		1			
R3-07641-004-F004	5/17/2000	1					
R3-07641-005-F005	5/17/2000	1		1			
R3-07641-006-F006	5/17/2000	1		1			
R3-07641-007-M001	5/17/2000				1		1
R3-07641-008-M002	5/17/2000				1		1
R3-07641-009-M003	5/17/2000				1		1
R3-07641-010-M004	5/17/2000				1		
R3-07641-011-M005	5/17/2000				1		1
R3-07641-012-M006	5/17/2000				1		1
COLUMN TOTALS:		18	0	12	18	0	13

HOUSATONIC RIVER PROJECT
RANA pipiens REPRODUCTION STUDY 2000
FEMALE ASSESSMENT DATA

Specimen Location	Specimen ID	Assessed Maturity ¹ (Adult/Juvenile)	Body Wt (g)	Rt Ovary Wt (g)	Lt Ovary Wt (g)	Total Ovary Wt (g)	Stripped Egg Mass Wt (g)	Total Ovary Wt (as % Body Wt)	Gravid (Y/N)	Ovary Sections														Stripped Eggs																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
										Rt Ovary Section Wt (g)	Lt Ovary Section Wt (g)	Right Section Egg Count	Left Section Egg Count	Total Egg Count	Oocytes Per Gram Ovary	Oocytes per Specimen	≥ Stage III Oocytes Egg Count	≥ Stage III Oocytes (%)	< Stage III Oocytes Egg Count	< Stage III Oocytes (%)	Necrotic Oocytes Egg Count	Necrotic Oocytes (%)	Stage VI Oocytes Egg Count	Stage VI Oocytes (%)	Stripped Egg Count	Attempted Egg Fert. Count	Fertilized Egg Count	Fertilized Egg (%)	Normal Appearing Egg Count	Normal Appearing Egg (%)	Hatched Egg Count	Hatched Egg (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
Site 31 (E-5) 37.0 mg/Kg Sediment PCB	F001 (A)	J	19.125																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

HOUSATONIC RIVER PROJECT
RANA pipiens REPRODUCTION STUDY 2000
FEMALE ASSESSMENT DATA

Spicimen Location	Specimen ID	Assessed Maturity' (Adult/Juvenile)	Body (g)	Rt Ovary Wt (g)	Lt Ovary Wt (g)	Total Ovary Wt (g)	Stripped Egg Mass Wt (g)	Total Ovary Wt (as % Body Wt)	Gravid (Y/N)	Ovary Sections										Stripped Eggs																					
										Rt Ovary Section Wt (g)	Lt Ovary Section Wt (g)	Right Section Egg Count	Left Section Egg Count	Total Egg Count	Oocytes Per Gram Ovary	Oocytes per Specimen	≥ Stage III Oocytes Egg Count (%)	< Stage III Oocytes Egg Count (%)	Necrotic Oocytes (%)	Stage VI Oocytes (%)	Stripped Egg Count	Attempted Egg Fert. Count	Fertilized Egg Count (%)	Normal Appearing Egg Count (%)	Hatched Egg Count (%)																
Site 36 (W-4) 0.46 mg/Kg Sediment PCB	F001 (F)	A	57.117	1.710	1.702	3.412		5.974	Y	0.500	0.404	610	506	1116	1235	4212	860	77.20	254	22.80	2	0.18	20	1.80																	
	F002 (F)	A	46.035	1.204	1.782	2.986		6.486	Y	2.986	0.000	960	0	960	322	960	638	67.30	322	33.97	12	1.25	25	2.64	0	N/A	600	304	50.67	273	89.80	0	0.00								
	F003 (A)	A	33.468																																						
	F005 (A)	A	36.410																																						
	N		4	2	2	2		2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2								
	Mean		43.26	1.46	1.74	3.20		6.23		1.74	0.20	785.00	253.00	110.31	778.01	2586.08	749.00	72.25	288.00	28.38	7.00	0.71	22.50	2.22	1	600.00	304.00	50.67	273.00	89.80	0.00	0.00									
	SD		10.69	0.36	0.06	0.30		0.36		1.76	0.29	247.49	357.80	110.31	645.60	2299.62	156.98	7.00	48.08	7.90	7.07	0.76	3.54	0.60																	
	SEM		5.34	0.25	0.04	0.21		0.26		1.24	0.20	175.00	253.00	78.00	456.51	1626.08	111.00	4.95	34.00	5.58	5.00	0.54	2.50	0.42																	
Site 37 (EW-3) 30.0 mg/Kg Sediment PCB	F001 (F)	A	50.245	4.177	2.848	7.025		13.981	Y	0.616	0.474	334	386	720	661	4640	267	38.14	433	61.86	20	2.78	18	2.57																	
	F002 (F)	A	57.972	2.296	1.737	4.033		6.957	N	0.466	0.538	772	870	1642	1635	6596	0	0.00	1640	#####	2	0.12	8	0.49		N/A															
	F003 (F)	A	62.295	5.015	6.310	11.325		18.180	Y	0.812	0.000	279	0	279	344	3891	162	58.06	117	41.94	0	0.00	0	0.00		N/A															
	F004 (N)	J	13.066	0.073	0.088	0.161		0.130	N	Counts not possible for stage I oocytes.										All oocytes are Stage I.																					
	F005 (N)	J	10.255	0.038	0.022	0.060		0.585	N	Counts not possible for stage I oocytes.										All oocytes are Stage I.																					
	F006-D001		FROG ARRIVED DEAD																																						
	F007 (A)	A	56.840																																						
	F008 (A)	A	51.320																																						
	F009 (N)	J	12.789	0.079	0.082	0.161		1.259	N	Counts not possible for stage I oocytes.										All oocytes are Stage I.																					
		N		5	3	3	3		3		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		1	279.00	1	0.00	1	0.00	1	0.00	1	0.00					
	Mean		55.73	3.83	3.63	7.46		13.04		0.63	0.34	461.67	418.67	880.33	879.87	5042.47	143.00	32.07	730.00	67.93	7.33	0.97	8.67	1.02		1	279.00	1	0.00	1	0.00	1	0.00	1	0.00						
	SD		4.97	1.39	2.39	3.67		5.67		0.17	0.29	270.16	435.92	695.50	673.28	1396.40	134.51	29.50	803.77	29.50	11.02	1.57	9.02	1.37																	
	SEM		2.22	0.80	1.38	2.12		3.27		0.10	0.17	155.98	251.68	401.55	388.72	806.21	77.66	17.03	464.05	17.03	6.36	0.91	5.21	0.79																	
Site 38 (E-1) 160.0 mg/Kg Sediment PCB	F001 (F)	A	37.990	0.507	0.623	1.130		2.974	N	0.111	0.138	442	476	918	3687	4166	0	0.00	918	#####	1	0.11	0	0.00																	
	F002 (F)	A	45.830	1.197	0.842	2.039		4.449	N	0.220	0.283	892	1170	2062	4099	8359	0	0.00	1999	96.94	0	0.00	0	0.00		N/A															
	F003 (A)	A	42.080																																						
	F004 (N)	A	22.452	0.213	0.261	0.474		2.111	N	0.064	0.052	171	154	325	2802	1328	0	0.00	325	#####	0	0.00	0	0.00																	
	F005 (A)	A	30.938																																						
	F007 (F)	A	48.170	0.680	0.830	1.510		3.135	N	0.177	0.206	721	646	1367	3569	5389	0	0.00	1367	#####	0	0.00	0	0.00																	
	N		6	4	4	4		4		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4																	
	Mean		37.91	0.65	0.64	1.29		3.17		0.14	0.17	556.50	611.50	3539.27	4810.55	0.00	0.00	1152.25	99.26	0.25	0.03	0.00	0.00	0.00																	
	SD		9.73	0.41	0.27	0.66		0.97		0.07	0.10	316.93	424.57	733.03	541.72	2913.64	0.00	0.00	707.65	1.55	0.50	0.05	0.00	0.00	0.00																
	SEM		3.97	0.21	0.14	0.33		0.48		0.03	0.05	158.47	212.28	366.51	270.86	1456.82	0.00	0.00	353.83	0.77	0.25	0.03	0.00	0.00	0.00																
Site 39 (W-1) 0.15 mg/Kg Sediment PCB	F001 (F)	A	76.560	5.602	4.813	10.415		13.604	Y	0.907	0.986	590	769	1359	718	7477	819	60.58	533	39.42	7	0.52	24	1.78		1352		0	0.00	0	0.00	0	0.00								
	F002 (F)	A	47.270	1.293	0.844	2.137		4.521	N	0.211	0.289	1076	1129	2205	4410	9424	0	0.00	2201	#####	4	0.18	0	0.00		N/A															
	F003 (A)	A	50.370																																						
	F004 (A)	A	46.600																																						
	F005 (A)	A	35.400																																						
	F006 (N)	A	45.811	0.295	0.352	0.647		1.412	N	Counts not possible for stage I oocytes.										All oocytes are Stage I.																					
	F007 (N)	J	9.860	0.051	0.045	0.096		0.974	N	Counts not possible for stage I oocytes.										All oocytes are Stage I.																					
	F008 (N)	J	17.680	0.097	0.108	0.205		1.160	N	Counts not possible for stage I oocytes.										Oocytes are Stage I w/ some Stage II.																					
	F009 (N)	A	43.207	0.298	0.289	0.587		1.359	N	0.023	0.031	68	88	156	2889	1696	0	0.00	156	#####	0	0.00	0	0.00																	
	F010 (N)	A	45.441	0.602	0.265	0.867		1.908	N	0.062	0.054	142	168	310	2672	2317	0	0.00	310	#####	0	0.00	0	0.00																	
	N		8	5	5	5		5		0.30	0.34	469.00	538.50	#####	2672.30	5228.49	204.75	15.14	800.00	84.86	2.75	0.17	6.00	0.44		0	1352.00	1	0.00	1	0.00	1	0.00	1	0.00						
	Mean		48.83	1.63	1.31	2.93		4.56		0.41	0.45	465.77	497.34	960.75	1515.05	3812.98	204.75	15.14	800.00	84.86	2.75	0.17	6.00	0.44																	
	SD		18.28	2.00	1.72	3.71		4.59		0.21	0.25	232.88	248.67	480.37	757.53	1906.49																									
	SEM		6.46	0.89	0.77	1.66		2.05																																	
R1 Reference	F001 (F)	A	76.000	3.650	0.000	3.650	21.130	32.605	Y	3.650	0.000	711	0	711	195	711	711	#####	0	0.00	0	0.00	438	61.60	2674	1734	1090	62.86	1052	96.51	145	13.30									
	F002 (A)	A	70.900																																						
	F003 (F)	A	71.360	10.159	11.754	21.913	0.000	30.708	Y	1.992	2.470	994	1188	2182	489	10716	1690	77.45	492	22.55	0	0.00	1320	60.49																	
	F004 (A)	A	83.430																																						
	F005 (F)	A	79.740	2.560	3.250	5.810	14.469	25.431	Y	0.648	0.757	875	999	1874	1334	7749	572	30.52	1302	69.48	0	0.00	416	22.20	2866	519	367	70.71	357	97.28	294	80.11									
	F006 (N)	A	83.000	14.685	13.854	28.539	0.000	34.384	Y	0.865	0.982	134	155	289	156	4465	289	#####	0	0.00	0	0.00	239	82.70																	
	N		6	4	4	4	4	4		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	2	2	2	2	2	2	2	2								
	Mean		77.41	7.76	7.21	14.98	8.90	30.78		1.79	1.05	678.50	585.50	#####	543.52	5910.44	815.50	76.99	448.50	23.01	0.00	0.00	603.25	56.75	2770.00	1126.50	728.50	66.79	704.50	96.89	219.50	46.71									
	SD		5.55	5.71	6.64	12.17	10.63	3.87		1.37	1.03	381.09	595.02	907.61	547.40	4304.88	608.87	32.75	614.45	32.75	0.00	0.00	486.07	25.20	135.76	859.13	511.24	5.55	491.44	0.54	105.36	47.24									
	SEM		2.26	2.85	3.32	6.09	5.32	1.94		0.69	0.52	1																													

HOUSATONIC RIVER PROJECT
RANA pipiens REPRODUCTION STUDY 2000
FEMALE ASSESSMENT DATA

Spicimen Location	Specimen ID	Assessed Maturity ¹ (Adult/Juvenile)	Body Wt (g)	Rt Ovary Wt (g)	Lt Ovary Wt (g)	Total Ovary Wt (g)	Stripped Egg Mass Wt (g)	Total Ovary Wt (as % Body Wt)	Gravid (Y/N)	Ovary Sections										Stripped Eggs																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
										Rt Ovary Section Wt (g)	Lt Ovary Section Wt (g)	Right Section Egg Count	Left Section Egg Count	Total Egg Count	Oocytes Per Gram Ovary	Oocytes per Specimen	≥ Stage III Oocytes Egg Count	(%)	< Stage III Oocytes (%)	Necrotic Oocytes Egg Count	Stage VI Oocytes Egg Count	(%)	Stripped Egg Count	Attempted Egg Fert. Count	Fertilized Egg Count	(%)	Normal Appearing Egg Count	(%)	Hatched Egg Count	(%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
R2 Reference	F007 (A)	A	76.600																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												

¹ If a female weighed > 20g and/or showed signs of gravidity (oocytes > stage III), it was assessed as an adult. Juveniles were excluded from any analysis, including descriptive statistics

² Stripped Egg Mass Weight is estimated value.

³ Laid prematurely during culture.

(A) Analytical Specimen

(N) Necropsy Specimen

(F) Fertilization Specimen

**HOUSATONIC RIVER PROJECT
RANA pipiens REPRODUCTION STUDY 2000
SPERM HEAD/DYSMORPHOLOGY DATA**

Specimen Location	Specimen ID	Body Wt. (g)	Right Testis Wt. (g)	Total Sperm Counts					Sperm Heads/g Tissue ¹	Total Dysmorphology Counts					Mean Count	Abnormal (%)
				Chamber 1	Chamber 2	Chamber 3	Chamber 4	Mean Count		Chamber 1	Chamber 2	Chamber 3	Chamber 4			
Site 32 (W-9a) 4.3 mg/Kg Sediment PCB	M001	41.31	0.023	14	29	10	19	18.00	1.96E+06	2	2	0	3	1.75	9.722	
	M002	44.70	0.022	30	39	21	25	28.75	3.27E+06	4	4	1	1	2.50	8.696	
	M003	33.78	0.026	35	28	27	36	31.50	3.03E+06	2	2	1	1	1.50	4.762	
	M004	43.00	0.031	16	20	18	17	17.75	1.43E+06	2	2	1	2	1.75	9.859	
	Mean:	40.70	0.026					24.00	2.42E+06					1.88	8.260	
Site 33 (W-8) 120.0 mg/Kg Sediment PCB	M001	21.52	0.012	3	4	2	7	4.00	8.33E+05	1	2	2	2	1.75	43.750	
	M002	43.99	0.022	4	4	6	4	4.50	5.11E+05	2	1	3	2	2.00	44.444	
	M006	39.01	0.013	1	4	4	1	2.50	4.81E+05	1	1	1	1	1.00	40.000	
	Mean:	34.84	0.016					3.67	6.08E+05					1.58	42.731	
	Site 34 (W-7a) 18.0 mg/Kg Sediment PCB	M001	34.98	0.029	14	15	18		15.67	1.35E+06	3	3	2		2.67	17.021
M002		40.19	0.017	24	27	30		27.00	3.97E+06	4	1	5		3.33	12.346	
M003		33.45	0.017	22	25	22		23.00	3.38E+06	3	2	4		3.00	13.043	
M004		28.22	0.011	23	23	25		23.67	5.38E+06	1	2	1		1.33	5.634	
Mean:		34.21	0.019					22.33	3.52E+06					2.58	12.011	
Site 35 (W-6) 42.0 mg/Kg Sediment PCB	M001	43.74	0.031	17	13	14	20	16.00	1.29E+06	6	6	2	4	4.50	28.125	
	M002	37.95	0.022	12	11	18	17	14.50	1.65E+06	7	5	4	8	6.00	41.379	
	M003	43.74	0.046	19	22	24	20	21.25	1.15E+06	8	8	11	8	8.75	41.176	
	M004	32.77	0.014	27	13	25	23	22.00	3.93E+06	11	6	9	8	8.50	38.636	
	Mean:		0.028					18.44	2.01E+06					6.94	37.329	
Site 36 (W-4) 0.46 mg/Kg Sediment PCB	M004	37.22	0.031	60	43	60	59	55.50	4.48E+06	1	3	2	1	1.75	3.153	
	Mean:	37.22	0.031					55.50	4.48E+06					1.75	3.153	
Site 37 (EW-3) 30.0 mg/Kg Sediment PCB	M001	25.55	0.014	6	5	8	3	5.50	9.82E+05	5	3	4	2	3.50	63.636	
	M002	35.61	0.019	4	5	1	5	3.75	4.93E+05	3	3	0	1	1.75	46.667	
	M003	31.32	0.014	7	2	6	9	6.00	1.07E+06	2	2	2	3	2.25	37.500	
	M005	33.13	0.025	7	5	5	7	6.00	6.00E+05	4	0	4	4	3.00	50.000	
	Mean:	31.40	0.018					5.31	7.87E+05					2.63	49.451	

**HOUSATONIC RIVER PROJECT
RANA pipiens REPRODUCTION STUDY 2000
 SPERM HEAD/DYSMORPHOLOGY DATA**

Specimen Location	Specimen ID	Body Wt. (g)	Right Testis Wt. (g)	Total Sperm Counts				Mean Count	Sperm Heads/g Tissue ¹	Total Dysmorphology Counts				Mean Count	Abnormal (%)
				Chamber 1	Chamber 2	Chamber 3	Chamber 4			Chamber 1	Chamber 2	Chamber 3	Chamber 4		
Site 38 (E-1) 160.0 mg/Kg Sediment PCB	M001	41.55	0.042	37	35	32	30	33.50	1.99E+06	4	3	2	3	3.00	8.955
	M002	51.73	0.047	30	29	35	41	33.75	1.80E+06	5	4	5	5	4.75	14.074
	M003	34.88	0.008	22	39	28	22	27.75	8.67E+06	9	6	4	3	5.50	19.820
	M007	37.56	0.010	19	23	26	24	23.00	5.75E+06	3	3	3	4	3.25	14.130
	Mean:	41.43	0.027					29.50	4.55E+06					4.13	14.245
Site 39 (W-1) 0.15 mg/Kg Sediment PCB	M002	42.47	0.023	51	54	56	47	52.00	5.65E+06	2	3	2	4	2.75	5.288
	M003	33.32	0.044	58	45	48	50	50.25	2.86E+06	2	4	1	1	2.00	3.980
	M004	34.97	0.016	53	57	59	58	56.75	8.87E+06	3	2	2	1	2.00	3.524
	M006	35.17	0.046	55	48	64	54	55.25	3.00E+06	2	4	1	3	2.50	4.525
	Mean:	36.48	0.032					53.56	5.09E+06					2.31	4.329
R1 Reference	M001	43.06	0.041	71	70	72	81	73.50	4.48E+06	1	0	1	0	0.50	0.680
	M004	48.31	0.045	69	69	74	82	73.50	4.08E+06	1	0	0	1	0.50	0.680
	M005	35.50	0.030	75	71	80	82	77.00	6.42E+06	0	0	1	0	0.25	0.325
	M006	35.40	0.032	76	82	91	86	83.75	6.54E+06	0	0	0	0	0.00	0.000
	Mean:	40.57	0.037					76.94	5.38E+06					0.31	0.421
R2 Reference	M009	35.66	0.038	52	48	55	53	52.00	3.42E+06	0	1	1	1	0.75	1.442
	M011	41.89	0.010	48	57	66	63	58.50	1.46E+07	0	1	0	0	0.25	0.427
	M012	44.98	0.028	66	61	61	63	62.75	5.60E+06	1	1	0	0	0.50	0.797
	Mean:	40.84	0.025					57.75	7.88E+06					0.50	0.889
R3 Reference	M001	34.56	0.030	48	50	56	46	50.00	4.17E+06	1	2	0	1	1.00	2.000
	M002	35.56	0.042	46	54	49	56	51.25	3.05E+06	1	3	0	2	1.50	2.927
	M003	37.46	0.032	43	45	53	44	46.25	3.61E+06	0	2	2	0	1.00	2.162
	Mean:	35.86	0.035					49.17	3.61E+06					1.17	2.363

**HOUSATONIC RIVER PROJECT
RANA pipiens REPRODUCTION STUDY 2000
 SPERM HEAD/DYSMORPHOLOGY DATA**

Specimen Location	Specimen ID	Body Wt. (g)	Right Testis Wt. (g)	Total Sperm Counts					Sperm Heads/g Tissue ¹	Total Dysmorphology Counts					Mean Count	Abnormal (%)
				Chamber 1	Chamber 2	Chamber 3	Chamber 4	Mean Count		Chamber 1	Chamber 2	Chamber 3	Chamber 4			
R1, R2, R3 Pooled References	M001	43.06	0.041	71	70	72	81	73.50	4.48E+06	1	0	1	0	0.50	0.680	
	M004	48.31	0.045	69	69	74	82	73.50	4.08E+06	1	0	0	1	0.50	0.680	
	M005	35.50	0.030	75	71	80	82	77.00	6.42E+06	0	0	1	0	0.25	0.325	
	M006	35.40	0.032	76	82	91	86	83.75	6.54E+06	0	0	0	0	0.00	0.000	
	M009	35.66	0.038	52	48	55	53	52.00	3.42E+06	0	1	1	1	0.75	1.442	
	M011	41.89	0.010	48	57	66	63	58.50	1.46E+07	0	1	0	0	0.25	0.427	
	M012	44.98	0.028	66	61	61	63	62.75	5.60E+06	1	1	0	0	0.50	0.797	
	M001	34.56	0.030	48	50	56	46	50.00	4.17E+06	1	2	0	1	1.00	2.000	
	M002	35.56	0.042	46	54	49	56	51.25	3.05E+06	1	3	0	2	1.50	2.927	
	M003	37.46	0.032	43	45	53	44	46.25	3.61E+06	0	2	2	0	1.00	2.162	
	Mean:	39.24	0.033					62.850	5.60E+06					0.63	1.144	

¹[Mean Sperm Count]X[5(Square Factor)]X[104(Hemocytometer Factor)]X[5(Dilution Factor)]/Testis Wt.

HOUSATONIC RIVER PROJECT
***RANA pipiens* REPRODUCTION STUDY 2000**
MALE ASSESSMENT DATA

Specimen Location	Specimen ID	Body Wt (g)	Rt Testis Wt (g)	Lt Testis Wt (g)	Testes Wt (as % Body Wt)	Sperm Heads (X 10 ⁶)/g Tissue ¹	Abnormal (%)
Site 32 (W-9a) 4.3 mg/Kg Sediment PCB	M001 (F)	41.306	0.023	0.033	0.136	1.96E+06	9.722
	M002 (F)	44.700	0.022	0.033	0.123	3.27E+06	8.696
	M003 (F)	33.775	0.026	0.033	0.175	3.03E+06	4.762
	M004 (F)	42.998	0.031	0.036	0.156	1.43E+06	9.859
	M005 (A)	30.535					
	M006 (A)	32.545					
	M007 (N)	36.320	0.022	0.016	0.105		
	N	7	5	5	5	4	4
	Mean	37.454	0.025	0.030	0.139	2.42E+06	8.260
	SD	5.551	0.004	0.008	0.027	8.72E+05	2.389
	SEM	2.098	0.002	0.004	0.012	4.36E+05	1.194
Site 33 (W-8) 120.0 mg/Kg Sediment PCB	M001 (N)	21.517	0.012	0.007	0.088	8.33E+05	43.750
	M002 (N)	43.988	0.022	0.022	0.100	5.11E+05	44.444
	M003 (A)	43.890					
	M004 (A)	42.580					
	M005 (N)	40.007	0.007	0.012	0.047		
	M006 (N)	39.014	0.013	0.018	0.079	4.81E+05	40.000
	N	6	4	4	4	3	3
	Mean	38.499	0.014	0.015	0.079	6.08E+05	42.731
	SD	8.565	0.006	0.007	0.023	1.95E+05	2.391
	SEM	3.497	0.003	0.003	0.011	1.13E+05	1.380
Site 34 (W-7a) 18.0 mg/Kg Sediment PCB	M001 (F)	34.980	0.029	0.028	0.163	1.35E+06	17.021
	M002 (F)	40.190	0.017	0.017	0.085	3.97E+06	12.346
	M003 (F)	33.450	0.017	0.017	0.102	3.38E+06	13.043
	M004 (F)	28.220	0.011	0.010	0.074	5.38E+06	5.634
	M005 (N)	17.324	0.005	0.005	0.058		
	N	5	5	5	5	4	4
	Mean	30.833	0.016	0.015	0.096	3.52E+06	12.011
	SD	8.674	0.009	0.009	0.041	1.67E+06	4.724
	SEM	3.879	0.004	0.004	0.018	8.36E+05	2.362
Site 35 (W-6) 42.0 mg/Kg Sediment PCB	M001 (F)	43.740	0.031	0.037	0.155	1.29E+06	28.125
	M002 (F)	37.950	0.022	0.012	0.090	1.65E+06	41.379
	M003 (F)	43.740	0.046	0.047	0.213	1.15E+06	41.176
	M004 (F)	32.770	0.014	0.017	0.095	3.93E+06	38.636
	M005 (A)	31.570					
	M006 (A)	37.590					
	N	6	4	4	4	4	4
	Mean	37.893	0.028	0.028	0.138	2.01E+06	37.329
	SD	5.190	0.014	0.017	0.058	1.30E+06	6.262
	SEM	2.119	0.007	0.008	0.029	6.49E+05	3.131

HOUSATONIC RIVER PROJECT
***RANA pipiens* REPRODUCTION STUDY 2000**
MALE ASSESSMENT DATA

Specimen Location	Specimen ID	Body Wt (g)	Rt Testis Wt (g)	Lt Testis Wt (g)	Testes Wt (as % Body Wt)	Sperm Heads (X 10 ⁶)/g Tissue ¹	Abnormal (%)
Site 36 (W-4) 0.46 mg/Kg Sediment PCB	M001 (N)	13.623	0.004	0.003	0.051		
	M002 (A)	34.704					
	M003 (N)	13.156	0.008	0.007	0.114		
	M004 (F)	37.222	0.031	0.021	0.140	4.48E+06	3.153
	M005 (N)	11.936	0.003	0.003	0.050		
	N	5	4	4	4	1	1
	Mean	22.128	0.012	0.009	0.089	4.48E+06	3.153
	SD	12.676	0.013	0.009	0.045		
	SEM	5.669	0.007	0.004	0.023		
Site 37 (EW-3) 30.0 mg/Kg Sediment PCB	M001 (F)	25.545	0.014	0.013	0.106	9.82E+05	63.636
	M002 (F)	35.605	0.019	0.019	0.107	4.93E+05	46.667
	M003 (F)	31.320	0.014	0.013	0.086	1.07E+06	37.500
	M004 (A)	23.070					
	M005 (F)	33.132	0.025	0.024	0.148	6.00E+05	50.000
	M006 (A)	33.680					
	M008 (N)	10.425	0.006	0.006	0.115		
	N	7	5	5	5	4	4
	Mean	27.540	0.016	0.015	0.112	7.87E+05	49.451
	SD	8.805	0.007	0.007	0.023	2.83E+05	10.834
	SEM	3.328	0.003	0.003	0.010	1.41E+05	5.417
Site 38 (E-1) 160.0 mg/Kg Sediment PCB	M001 (F)	41.550	0.042	0.037	0.190	1.99E+06	8.955
	M002 (F)	51.730	0.047	0.038	0.164	1.80E+06	14.074
	M003 (F)	34.880	0.008	0.007	0.043	8.67E+06	19.820
	M004 (N)	11.814	0.007	0.007	0.119		
	M005 (A)	39.680					
	M006 (A)	28.240					
	M007 (F) ²	37.560	0.010	0.010	0.053	2.88E+06	14.130
	M008 (N)	14.348	0.003	0.003	0.042		
	N	8	6	6	6	4	4
	Mean	32.475	0.020	0.017	0.102	3.83E+06	14.245
	SD	13.680	0.020	0.016	0.065	3.26E+06	4.439
	SEM	4.837	0.008	0.007	0.027	1.63E+06	2.219
Site 39 (W-1) 0.15 mg/Kg Sediment PCB	M001 (A)	50.600					
	M002 (F)	42.470	0.023	0.037	0.141	5.65E+06	5.288
	M003 (F)	33.320	0.044	0.024	0.204	2.73E+06	3.980
	M004 (F)	34.970	0.016	0.023	0.112	8.87E+06	3.524
	M005 (A)	28.370					
	M006 (F)	35.170	0.046	0.022	0.193	3.00E+06	4.525
	M007 (A)	19.240					
	N	7	4	4	4	4	4
	Mean	34.877	0.032	0.027	0.163	5.06E+06	4.329
	SD	9.952	0.015	0.007	0.044	2.86E+06	0.759
	SEM	3.761	0.008	0.004	0.022	1.43E+06	0.380

HOUSATONIC RIVER PROJECT
***RANA pipiens* REPRODUCTION STUDY 2000**
MALE ASSESSMENT DATA

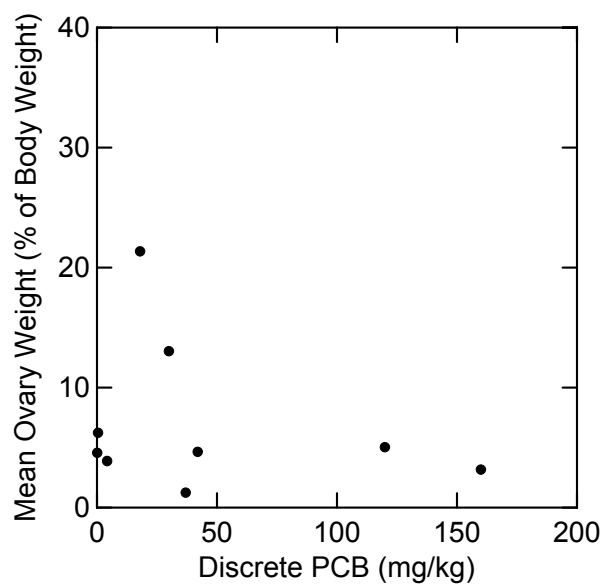
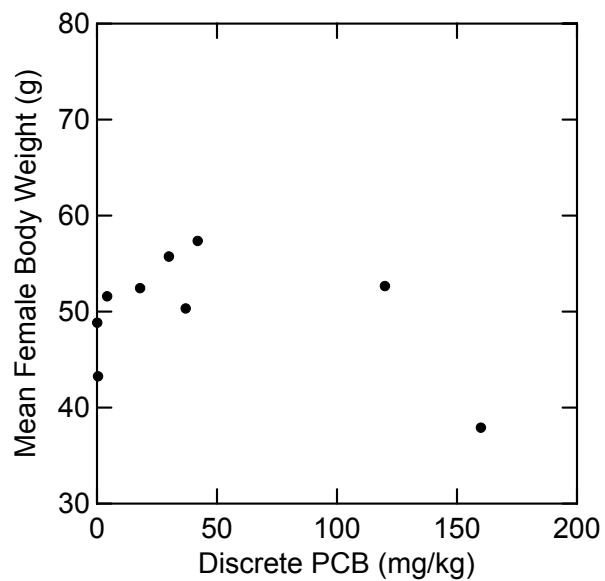
Specimen Location	Specimen ID	Body Wt (g)	Rt Testis Wt (g)	Lt Testis Wt (g)	Testes Wt (as % Body Wt)	Sperm Heads (X 10 ⁶)/g Tissue ¹	Abnormal (%)
R1 Reference	M001 (F)	43.060	0.041	0.040	0.188	4.48E+06	0.680
	M002 (A)	24.260					
	M003 (A)	35.950					
	M004 (F)	48.310	0.045	0.043	0.182	4.08E+06	0.680
	M005 (F)	35.500	0.030	0.034	0.180	6.42E+06	0.325
	M006 (F)	35.400	0.032	0.022	0.153	6.54E+06	0.000
	N	6	4	4	4	4	4
	Mean	37.080	0.037	0.035	0.176	5.38E+06	0.421
	SD	8.159	0.007	0.009	0.016	1.28E+06	0.327
	SEM	3.331	0.004	0.005	0.008	6.40E+05	0.164
R2 Reference	M007 (A)	31.860					
	M008 (A)	41.400					
	M009 (F)	35.660	0.038	0.037	0.210	3.42E+06	1.442
	M010 (F)	29.580	0.000	0.014	0.047		
	M011 (F)	41.890	0.010	0.009	0.045	1.46E+07	0.427
	M012 (F)	44.980	0.028	0.027	0.122	5.60E+06	0.797
	N	6	4	4	4	3	3
	Mean	37.562	0.019	0.022	0.106	7.88E+06	0.889
	SD	6.137	0.017	0.013	0.078	5.94E+06	0.514
	SEM	2.506	0.009	0.006	0.039	3.43E+06	0.297
R3 Reference	M001 (F)	34.560	0.030	0.033	0.182	4.17E+06	2.000
	M002 (F)	35.559	0.042	0.035	0.217	3.05E+06	2.927
	M003 (F)	37.463	0.032	0.020	0.139	3.61E+06	2.162
	M004 (A)	27.057					
	M005 (F)	34.678	0.029	0.017	0.133		
	M006 (F)	33.637	0.007	0.006	0.039		
	N	6	5	5	5	3	3
	Mean	33.826	0.028	0.022	0.142	3.61E+06	2.363
	SD	3.560	0.013	0.012	0.067	5.58E+05	0.495
	SEM	1.453	0.006	0.005	0.030	3.22E+05	0.286

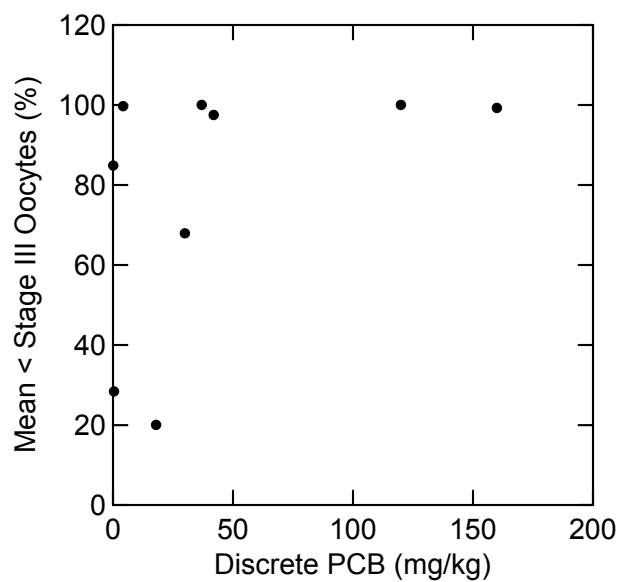
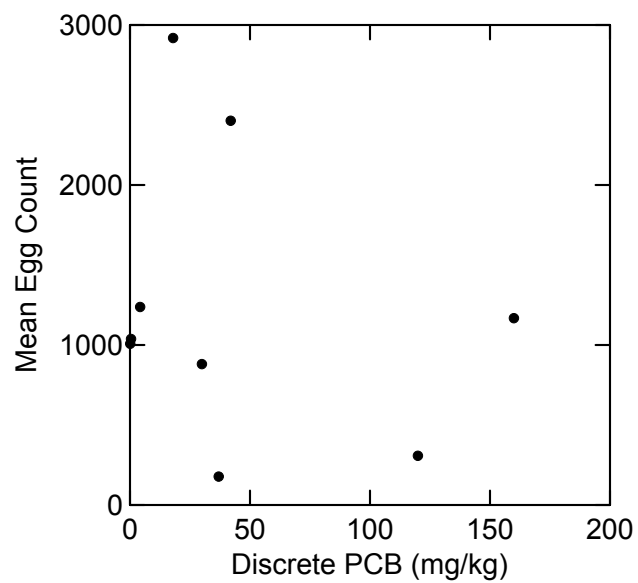
HOUSATONIC RIVER PROJECT
***RANA pipiens* REPRODUCTION STUDY 2000**
MALE ASSESSMENT DATA

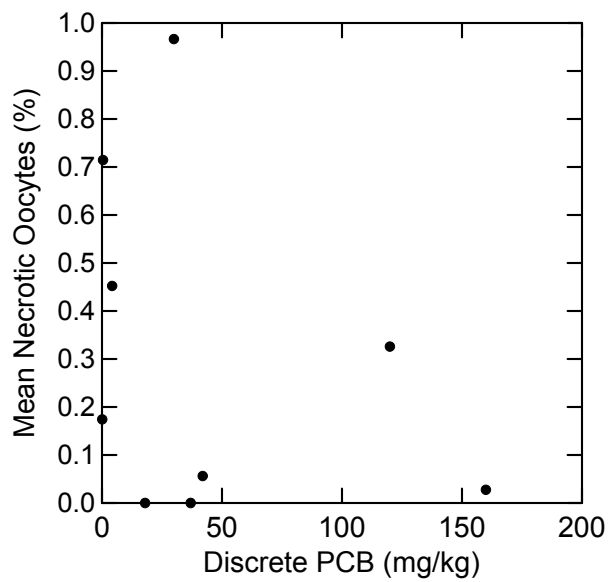
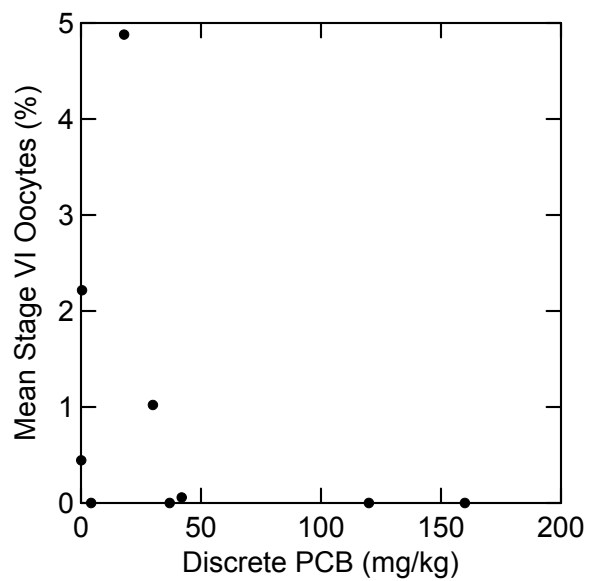
Specimen Location	Specimen ID	Body Wt (g)	Rt Testis Wt (g)	Lt Testis Wt (g)	Testes Wt (as % Body Wt)	Sperm Heads (X 10 ⁶)/g Tissue ¹	Abnormal (%)
R1, R2, R3 Pooled References	M001 (F)	43.060	0.041	0.040	0.188	4.48E+06	0.680
	M002 (A)	24.260					
	M003 (A)	35.950					
	M004 (F)	48.310	0.045	0.043	0.182	4.08E+06	0.680
	M005 (F)	35.500	0.030	0.034	0.180	6.42E+06	0.325
	M006 (F)	35.400	0.032	0.022	0.153	6.54E+06	0.000
	M007 (A)	31.860					
	M008 (A)	41.400					
	M009 (F)	35.660	0.038	0.037	0.210	3.42E+06	1.442
	M010 (F)	29.580	0.000	0.014	0.047		
	M011 (F)	41.890	0.010	0.009	0.045	1.46E+07	0.427
	M012 (F)	44.980	0.028	0.027	0.122	5.60E+06	0.797
	M001 (F)	34.560	0.030	0.033	0.182	4.17E+06	2.000
	M002 (F)	35.559	0.042	0.035	0.217	3.05E+06	2.927
	M003 (F)	37.463	0.032	0.020	0.139	3.61E+06	2.162
	M004 (A)	27.057					
	M005 (F)	34.678	0.029	0.017	0.133		
	M006 (F)	33.637	0.007	0.006	0.039		
	N	18	13	13	13	10	10
	Mean	36.156	0.028	0.026	0.141	5.60E+06	1.144
	SD	6.107	0.014	0.012	0.062	3.40E+06	0.948
	SEM	1.439	0.004	0.003	0.017	1.07E+06	0.300

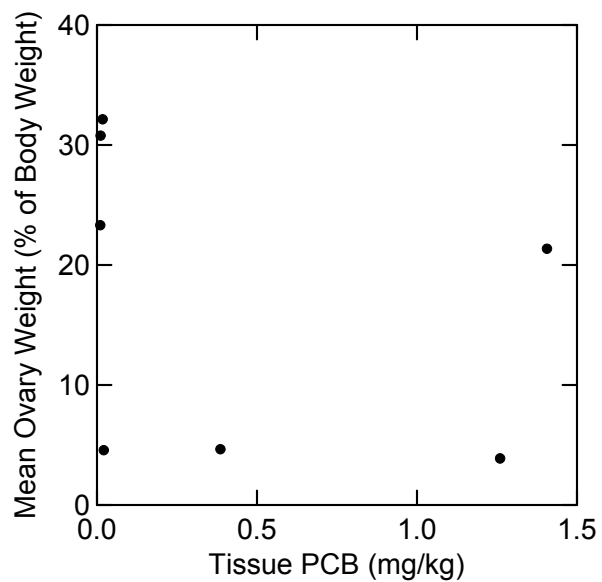
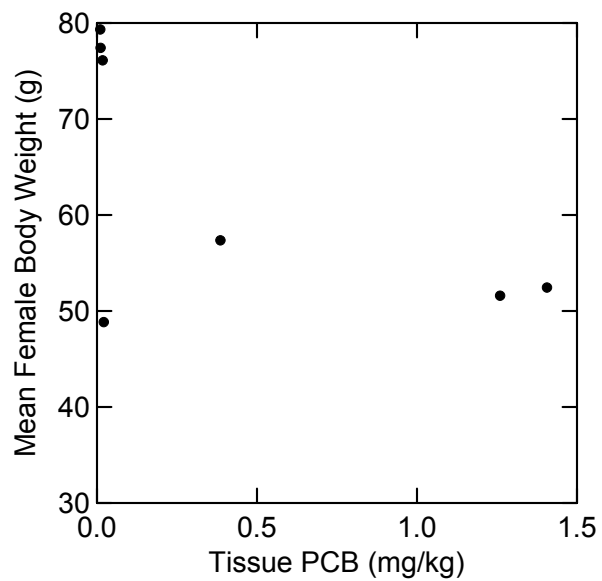
¹[Mean Sperm Count]X[5(Square Factor)]X[104(Hemacytometer Factor)]X[5(Dilution Factor)]/Testis¹

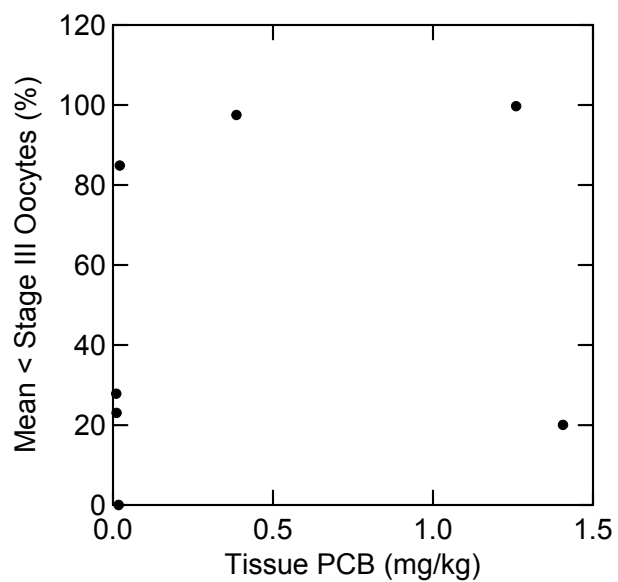
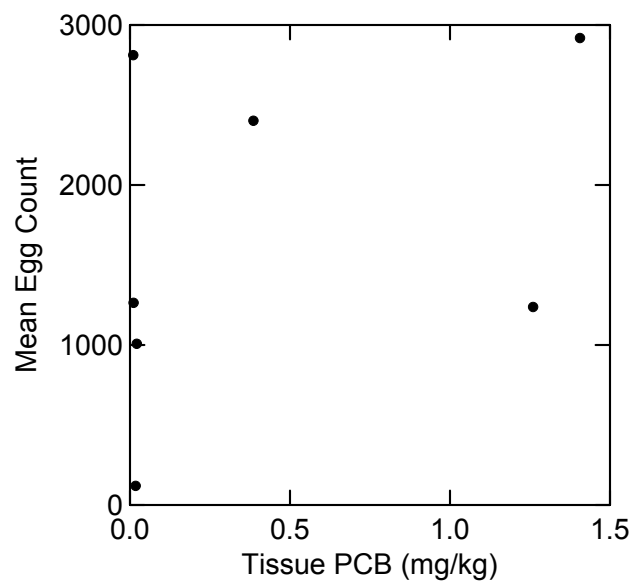
²Testes weights are estimated values

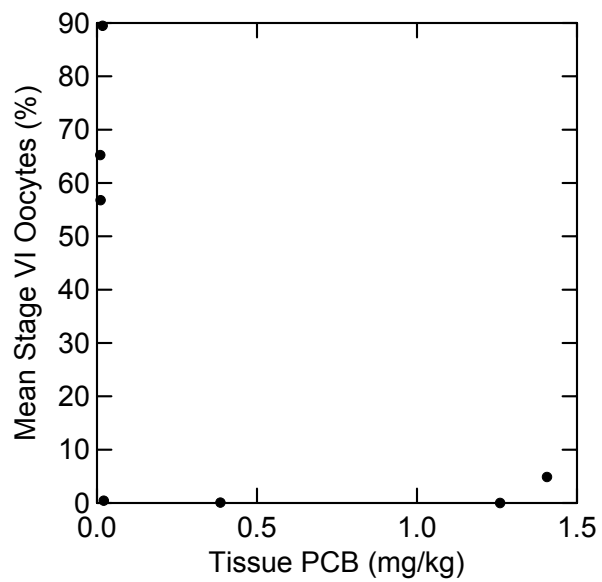
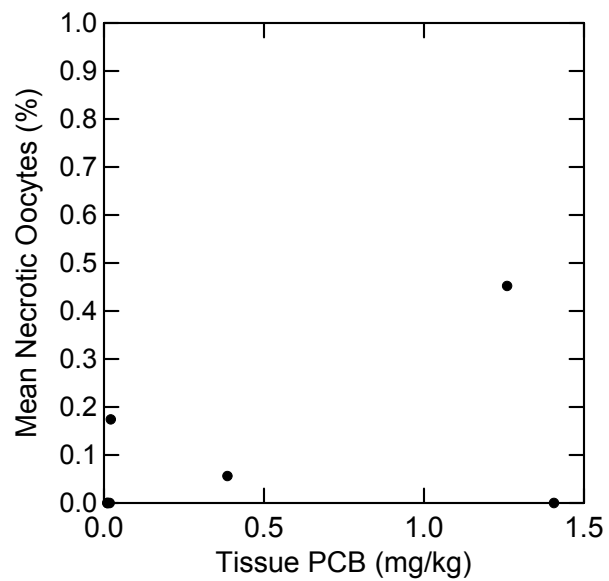


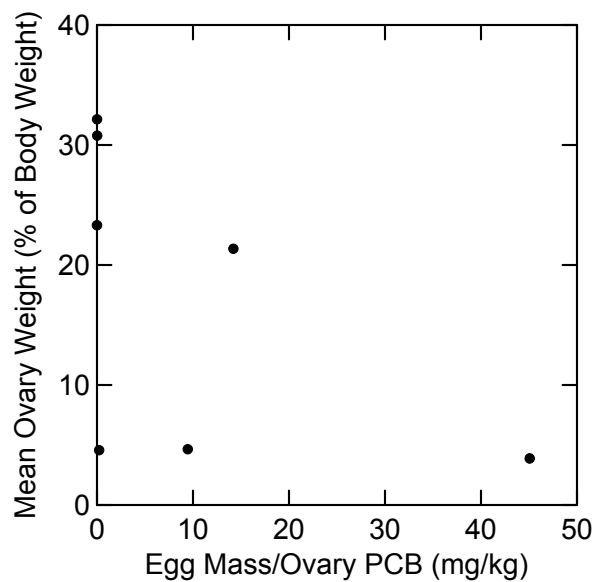
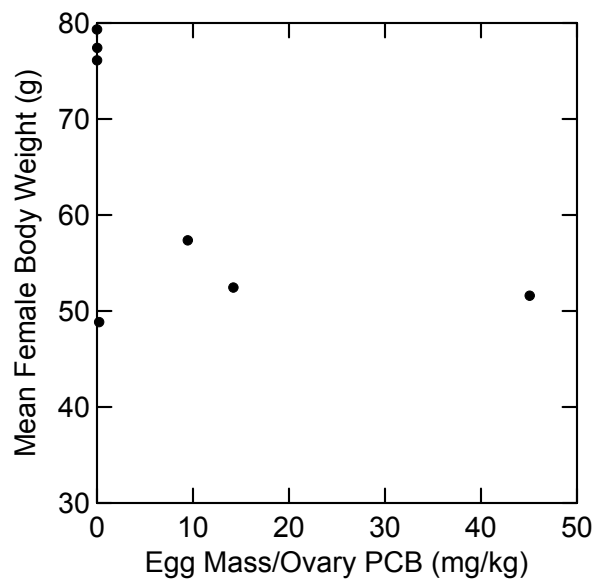


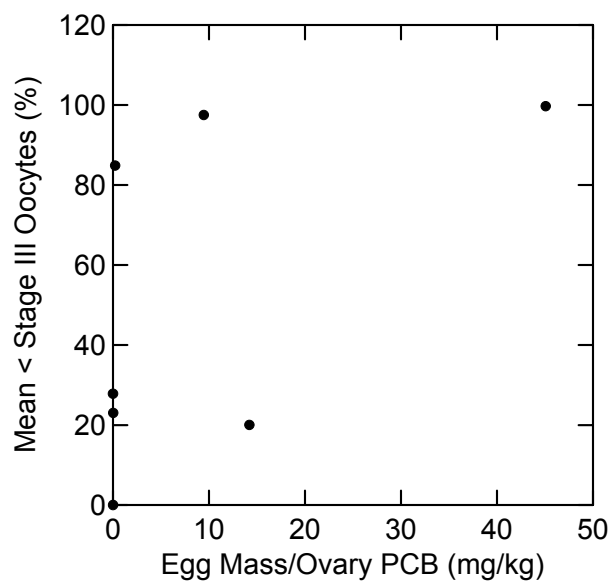
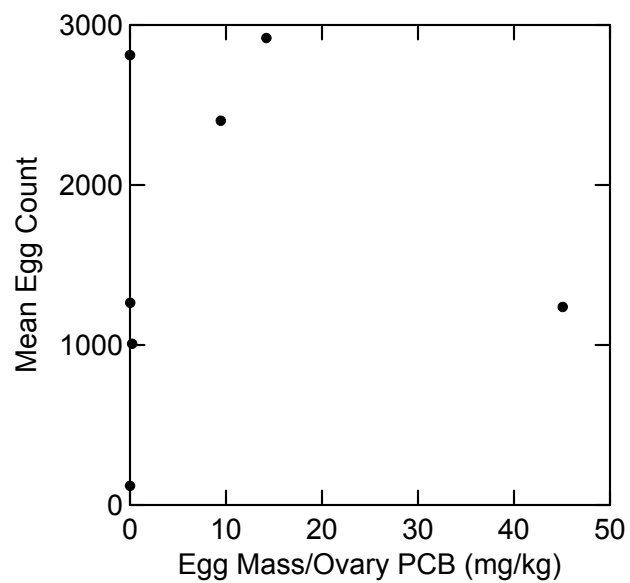


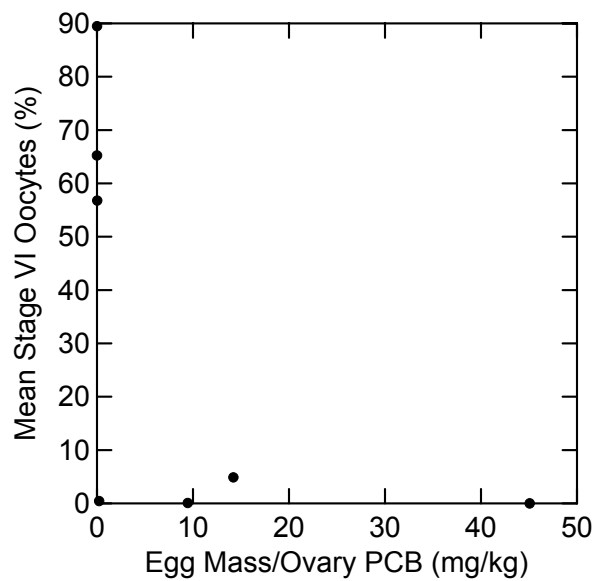
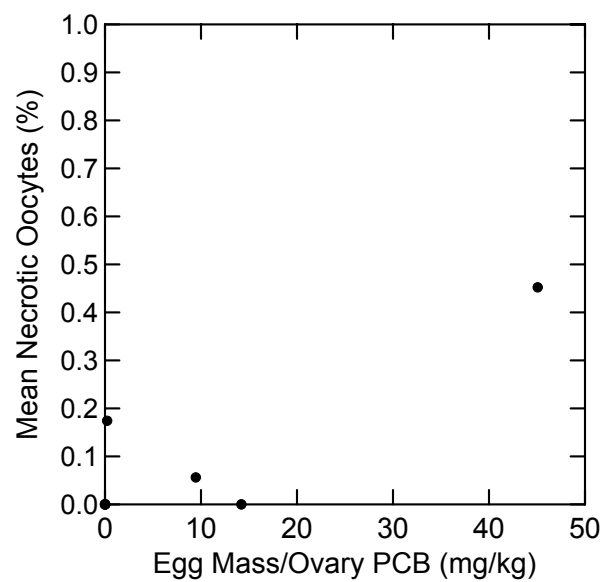












Appendix E

Developmental Study Data

Crossover Study Data

Spike Study Data

Developmental Study

Raw Data:

Mortality/Metamorphosis

Larval Stage/Malformations

Larval Growth

HOUSATONIC RIVER PROJECT
***RANA pipiens* DEVELOPMENTAL STUDY 2000**
MORTALITY/METAMORPH DATA SUMMARY

Site W-7a (18.0 mg/Kg Sed. PCB) Reps=4, 142 Days*					
DAY	Mortality		Metamorph		N
	%	SEM	%	SEM	
0	0.00	0.00	0.00	0.00	105
7	0.00	0.00	0.00	0.00	
13	3.00	1.00	0.00	0.00	
24	54.33	6.19	0.00	0.00	
31	71.17	5.60	0.00	0.00	
36	76.17	6.96	0.00	0.00	
49	81.67	5.09	0.00	0.00	
71	85.00	1.91	0.00	0.00	
105	85.00	1.91	0.00	0.00	
133	87.67	0.33	1.00	1.00	
142	87.67	0.33	1.00	1.00	
Cumulative	87.67	0.33	1.00	1.00	

Site W-6 (42.0 mg/Kg Sed. PCB) Reps=4, 128 Days*					
DAY	Mortality		Metamorph		N
	%	SEM	%	SEM	
0	0.00	0.00	0.00	0.00	98
10	0.00	0.00	0.00	0.00	
17	13.09	4.06	0.00	0.00	
22	75.65	10.88	0.00	0.00	
35	84.65	5.29	0.00	0.00	
57	84.65	5.29	0.00	0.00	
91	88.65	4.58	0.00	0.00	
106	90.65	3.66	1.00	1.00	
108	90.65	3.66	2.00	2.00	
113	90.65	3.66	3.00	3.00	
128	91.74	2.96	3.00	3.00	
Cumulative	91.74	2.96	3.00	3.00	

Site W-4 (0.46 mg/Kg Sed. PCB) Reps=8, 148 Days*					
DAY	Mortality		Metamorph		N
	%	SEM	%	SEM	
0	0.00	0.00	0.00	0.00	210
6	1.92	1.92	0.00	0.00	
13	27.08	26.08	0.00	0.00	
19	47.33	16.33	0.00	0.00	
30	84.58	4.58	0.00	0.00	
37	86.08	3.08	0.00	0.00	
42	88.58	0.58	0.00	0.00	
55	92.08	0.08	0.00	0.00	
77	92.08	0.08	0.00	0.00	
111	92.58	0.58	0.42	0.42	
113	92.58	0.58	0.42	0.42	
133	93.58	0.42	0.92	0.92	
148	95.58	0.42	0.92	0.92	
Cumulative	92.58	0.42	0.92	0.92	

Site EW-3 (30.0 mg/Kg Sed. PCB) Reps=1, 28 Days*					
DAY	Mortality		Metamorph		N
	%	SEM	%	SEM	
0	0.00	na	0.00	na	10
10	10.00	na	0.00	na	
17	20.00	na	0.00	na	
22	70.00	na	0.00	na	
24	90.00	na	0.00	na	
28	100.00	na	0.00	na	
Cumulative	100.00	na	0.00	na	

Site W-1 (0.15 mg/Kg Sed. PCB) Reps=4, 142 Days*					
DAY	Mortality		Metamorph		N
	%	SEM	%	SEM	
0	0.00	0.00	0.00	0.00	105
7	0.00	0.00	0.00	0.00	
14	47.83	3.72	0.00	0.00	
24	82.83	10.87	0.00	0.00	
31	83.67	10.92	0.00	0.00	
36	84.67	9.96	0.00	0.00	
49	84.67	9.96	0.00	0.00	
71	85.67	10.38	0.00	0.00	
105	86.67	9.43	0.00	0.00	
142	91.67	5.00	0.00	0.00	
Cumulative	91.67	5.00	0.00	0.00	

REFERENCE SITE DATA SHARED WITH CROSSOVER STUDY					
R3 in Ref Site MP (0.04 mg/Kg Sed. PCB) Reps=8, 113 Days*					
DAY	Mortality		Metamorph		N
	%	SEM	%	SEM	
0	0.00	0.00	0.00	0.00	160
7	11.25	1.25	0.00	0.00	
20	12.50	1.25	0.00	0.00	
42	14.38	0.63	0.00	0.00	
48	14.38	0.63	0.00	0.00	
76	21.88	4.38	0.00	0.00	
84	22.50	5.00	2.50	0.00	
96	25.00	3.75	5.63	1.88	
113	43.75	1.25	5.63	1.88	
Cumulative	43.75	1.25	5.63	1.88	

Metamorph Data Summary of Additional R3 Specimens			
R3 in Dechlorinated Tap Water			
	Metamorph		
	%	SEM	N
Cumulative	62.50	6.69	160

*Test Duration

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
SITE 34 (W-7a), 18.0 mg/Kg SEDIMENT PCB

EM01-1								EM01-2								EM01-3								EM01-4								CUMULATIVE					CUMULATIVE				
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)								
4/25/2000	0	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na							
4/26/2000	1	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na							
4/27/2000	2	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na							
4/28/2000	3	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na							
5/1/2000	6	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na							
5/2/2000	7	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na							
5/8/2000	13	0	0	30		0.00	0.00	1	1	24		4.00	0.00	1	1	24		4.00	0.00	1	1	24		4.00	0.00	3.00	4.00	1.00	66.67	0.00	0.00	0.00	0.00	na							
5/9/2000	14	0	0	30		0.00	0.00	1	1	24		4.00	0.00	1	2	23		4.00	0.00	0	1	24		4.00	0.00	4.00	10.67	1.63	81.65	0.00	0.00	0.00	0.00	na							
5/11/2000	16	8	8	22		26.67	0.00	4	5	20		20.00	0.00	5	7	18		28.00	0.00	1	2	23		8.00	0.00	20.67	83.56	4.57	44.23	0.00	0.00	0.00	0.00	na							
5/12/2000	17	7	15	15		50.00	0.00	7	12	13		48.00	0.00	2	9	16		36.00	0.00	3	5	20		20.00	0.00	38.50	190.33	6.90	35.83	0.00	0.00	0.00	0.00	na							
5/15/2000	20	0	15	15		50.00	0.00	5	17	8		68.00	0.00	3	12	13		48.00	0.00	4	9	16		36.00	0.00	50.50	174.33	6.60	26.15	0.00	0.00	0.00	0.00	na							
5/17/2000	22	1	16	14		53.33	0.00	1	18	7		72.00	0.00	0	12	13		48.00	0.00	1	10	15		40.00	0.00	53.33	184.89	6.80	25.50	0.00	0.00	0.00	0.00	na							
5/19/2000	24	0	16	14		53.33	0.00	0	18	7		72.00	0.00	0	12	13		48.00	0.00	1	11	14		44.00	0.00	54.33	153.33	6.19	22.79	0.00	0.00	0.00	0.00	na							
5/22/2000	27	0	16	14		53.33	0.00	0	18	7		72.00	0.00	8	20	5		80.00	0.00	3	14	11		56.00	0.00	65.33	163.56	6.39	19.57	0.00	0.00	0.00	0.00	na							
5/23/2000	28	0	16	14		53.33	0.00	0	18	7		72.00	0.00	1	21	4		84.00	0.00	1	15	10		60.00	0.00	67.33	183.11	6.77	20.10	0.00	0.00	0.00	0.00	na							
5/24/2000	29	0	16	14		53.33	0.00	0	18	7		72.00	0.00	0	21	4		84.00	0.00	1	16	9		64.00	0.00	68.33	167.56	6.47	18.94	0.00	0.00	0.00	0.00	na							
5/25/2000	30	1	17	13		56.67	0.00	0	18	7		72.00	0.00	0	21	4		84.00	0.00	0	16	9		64.00	0.00	69.17	137.00	5.85	16.92	0.00	0.00	0.00	0.00	na							
5/26/2000	31	0	17	13		56.67	0.00	0	18	7		72.00	0.00	0	21	4		84.00	0.00	2	18	7		72.00	0.00	71.17	125.44	5.60	15.74	0.00	0.00	0.00	0.00	na							
5/30/2000	35	0	17	13		56.67	0.00	1	19	6		76.00	0.00	0	21	4		84.00	0.00	4	22	3		88.00	0.00	76.17	193.89	6.96	18.28	0.00	0.00	0.00	0.00	na							
5/31/2000	36	0	17	13		56.67	0.00	0	19	6		76.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	76.17	193.89	6.96	18.28	0.00	0.00	0.00	0.00	na							
6/1/2000	37	0	17	13		56.67	0.00	1	20	5		80.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	77.17	197.44	7.03	18.21	0.00	0.00	0.00	0.00	na							
6/2/2000	38	0	17	13		56.67	0.00	0	20	5		80.00	0.00	0	21	4		84.00	0.00	3	0	0		88.00	0.00	77.17	197.44	7.03	18.21	0.00	0.00	0.00	0.00	na							
6/5/2000	41	3	20	10		66.67	0.00	2	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	81.67	103.56	5.09	12.46	0.00	0.00	0.00	0.00	na							
6/6/2000	42	0	20	10		66.67	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	81.67	103.56	5.09	12.46	0.00	0.00	0.00	0.00	na							
6/8/2000	44	0	20	10		66.67	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	81.67	103.56	5.09	12.46	0.00	0.00	0.00	0.00	na							
6/12/2000	48	0	20	10		66.67	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	81.67	103.56	5.09	12.46	0.00	0.00	0.00	0.00	na							
6/13/2000	49	0	20	10		66.67	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	81.67	103.56	5.09	12.46	0.00	0.00	0.00	0.00	na							
6/14/2000	50	0	20	10		66.67	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	81.67	103.56	5.09	12.46	0.00	0.00	0.00	0.00	na							
6/15/2000	51	0	20	10		66.67	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	81.67	103.56	5.09	12.46	0.00	0.00	0.00	0.00	na							
6/16/2000	52	0	20	10		66.67	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	81.67	103.56	5.09	12.46	0.00	0.00	0.00	0.00	na							
6/19/2000	55	2	22	8		73.33	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	83.33	48.00	3.46	8.31	0.00	0.00	0.00	0.00	na							
6/20/2000	56	2	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	0.00	na							
6/21/2000	57	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	0.00	na							
6/22/2000	58	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	0.00	na							
6/23/2000	59	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	0.00	na							
6/26/2000	62	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	0.00	na							
6/27/2000	63	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	0.00	na							
6/28/2000	64	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	0.00	na							
6/29/2000	65	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		8																	

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
SITE 34 (W-7a), 18.0 mg/Kg SEDIMENT PCB

EM01-1										EM01-2										EM01-3										EM01-4										CUMULATIVE					CUMULATIVE				
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)																
8/17/2000	114	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	na																
8/18/2000	115	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	na																
8/21/2000	118	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	na																
8/22/2000	119	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	na																
8/23/2000	120	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	na																
8/24/2000	121	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	na																
8/25/2000	122	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	na																
8/28/2000	125	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	na																
8/29/2000	126	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	na																
8/30/2000	127	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	na																
8/31/2000	128	0	24	6		80.00	0.00	0	22	3		88.00	0.00	0	21	4		84.00	0.00	0	22	3		88.00	0.00	85.00	14.67	1.91	4.51	0.00	0.00	0.00	na																
9/1/2000	129	0	24	6		80.00	0.00	0	22	3		88.00	0.00	1	22	3		88.00	0.00	0	22	3		88.00	0.00	86.00	16.00	2.00	4.65	0.00	0.00	0.00	na																
9/5/2000	133	2	26	4		86.67	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	0	22	3	1		88.00	4.00	87.67	0.44	0.33	0.76	1.00	4.00	1.00	200.00															
9/6/2000	134	0	26	4		86.67	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	0	22	3	1		88.00	4.00	87.67	0.44	0.33	0.76	1.00	4.00	1.00	200.00															
9/7/2000	135	0	26	4		86.67	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	0	22	3	1		88.00	4.00	87.67	0.44	0.33	0.76	1.00	4.00	1.00	200.00															
9/8/2000	136	0	26	4		86.67	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	0	22	3	1		88.00	4.00	87.67	0.44	0.33	0.76	1.00	4.00	1.00	200.00															
9/11/2000	139	0	26	4		86.67	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	0	22	3	1		88.00	4.00	87.67	0.44	0.33	0.76	1.00	4.00	1.00	200.00															
9/12/2000	140	0	26	4		86.67	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	0	22	3	1		88.00	4.00	87.67	0.44	0.33	0.76	1.00	4.00	1.00	200.00															
9/13/2000	141	0	26	4		86.67	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	0	22	3	1		88.00	4.00	87.67	0.44	0.33	0.76	1.00	4.00	1.00	200.00															
9/14/2000	142	0	26	4		86.67	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	0	22	3	1		88.00	4.00	87.67	0.44	0.33	0.76	1.00	4.00	1.00	200.00															

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
SITE 35 (W-6), 42.0 mg/Kg SEDIMENT PCB

TP01-1								TP01-2								TP01-3								TP01-4								CUMULATIVE MORTALITY STATISTICS				CUMULATIVE METAMORPH STATISTICS			
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)						
5/9/2000	0	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	23		0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na					
5/11/2000	2	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	23		0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na					
5/12/2000	3	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	23		0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na					
5/15/2000	6	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	23		0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na					
5/17/2000	8	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	23		0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na					
5/19/2000	10	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	23		0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na					
5/22/2000	13	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	23		0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na					
5/23/2000	14	3	3	22		12.00	0.00	0	0	25		0.00	0.00	1	1	24		4.00	0.00	0	0	23		0.00	0.00	4.00	32.00	2.83	141.42	0.00	0.00	0.00	na						
5/24/2000	15	0	3	22		12.00	0.00	0	0	25		0.00	0.00	0	1	24		4.00	0.00	0	0	23		0.00	0.00	4.00	32.00	2.83	141.42	0.00	0.00	0.00	na						
5/25/2000	16	1	4	21		16.00	0.00	2	2	23		8.00	0.00	0	1	24		4.00	0.00	1	1	22		4.35	0.00	8.09	31.10	2.79	68.96	0.00	0.00	0.00	na						
5/26/2000	17	1	5	20		20.00	0.00	0	2	23		8.00	0.00	4	5	20		20.00	0.00	0	1	22		4.35	0.00	13.09	65.94	4.06	62.05	0.00	0.00	0.00	na						
5/30/2000	21	12	17	8		68.00	0.00	8	10	15		40.00	0.00	20	25	0		100.00	0.00	17	18	5		78.26	0.00	71.57	620.81	12.46	34.82	0.00	0.00	0.00	na						
5/31/2000	22	1	18	7		72.00	0.00	2	12	13		48.00	0.00	0	25	0		100.00	0.00	1	19	4		82.61	0.00	75.65	473.06	10.88	28.75	0.00	0.00	0.00	na						
6/1/2000	23	0	18	7		72.00	0.00	1	13	12		52.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	76.65	403.32	10.04	26.20	0.00	0.00	0.00	na						
6/2/2000	24	0	18	7		72.00	0.00	0	13	12		52.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	76.65	403.32	10.04	26.20	0.00	0.00	0.00	na						
6/5/2000	27	1	19	6		76.00	0.00	7	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/6/2000	28	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/8/2000	30	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/12/2000	34	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/13/2000	35	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/14/2000	36	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/15/2000	37	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/16/2000	38	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/19/2000	41	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/20/2000	42	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/21/2000	43	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/22/2000	44	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/23/2000	45	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/26/2000	48	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/27/2000	49	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/28/2000	50	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/29/2000	51	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
6/30/2000	52	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
7/5/2000	57	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
7/6/2000	58	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
7/7/2000	59	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
7/10/2000	62	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
7/11/2000	63	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4		82.61	0.00	84.65	112.08	5.29	12.51	0.00	0.00	0.00	na						
7/12/2000	64	0	19	6		76.00	0.00	0	20	5		80.00	0.00	0	25	0		100.00	0.00	0	19	4																	

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
SITE 35 (W-6), 42.0 mg/Kg SEDIMENT PCB

		TP01-1						TP01-2						TP01-3						TP01-4						CUMULATIVE MORTALITY STATISTICS				CUMULATIVE METAMORPH STATISTICS			
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)
9/5/2000	119	0	23	2		92.00	0.00	0	22	3	3	88.00	12.00	0	25	0		100.00	0.00	1	20	3		86.96	0.00	91.74	35.05	2.96	6.45	3.00	36.00	3.00	200.00
9/6/2000	120	0	23	2		92.00	0.00	0	22	3	3	88.00	12.00	0	25	0		100.00	0.00	0	20	3		86.96	0.00	91.74	35.05	2.96	6.45	3.00	36.00	3.00	200.00
9/7/2000	121	0	23	2		92.00	0.00	0	22	3	3	88.00	12.00	0	25	0		100.00	0.00	0	20	3		86.96	0.00	91.74	35.05	2.96	6.45	3.00	36.00	3.00	200.00
9/8/2000	122	0	23	2		92.00	0.00	0	22	3	3	88.00	12.00	0	25	0		100.00	0.00	0	20	3		86.96	0.00	91.74	35.05	2.96	6.45	3.00	36.00	3.00	200.00
9/11/2000	125	0	23	2		92.00	0.00	0	22	3	3	88.00	12.00	0	25	0		100.00	0.00	0	20	3		86.96	0.00	91.74	35.05	2.96	6.45	3.00	36.00	3.00	200.00
9/12/2000	126	0	23	2		92.00	0.00	0	22	3	3	88.00	12.00	0	25	0		100.00	0.00	0	20	3		86.96	0.00	91.74	35.05	2.96	6.45	3.00	36.00	3.00	200.00
9/13/2000	127	0	23	2		92.00	0.00	0	22	3	3	88.00	12.00	0	25	0		100.00	0.00	0	20	3		86.96	0.00	91.74	35.05	2.96	6.45	3.00	36.00	3.00	200.00
9/14/2000	128	0	23	2		92.00	0.00	0	22	3	3	88.00	12.00	0	25	0		100.00	0.00	0	20	3		86.96	0.00	91.74	35.05	2.96	6.45	3.00	36.00	3.00	200.00

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
SITE 36 (W-4), 0.46 mg/Kg SEDIMENT PCB

		EM01-1						EM01-2						EM01-3						EM01-4						CUMULATIVE				CUMULATIVE			
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)
4/19/2000	0	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na	
4/20/2000	1	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na	
4/21/2000	2	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na	
4/24/2000	5	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na	
4/25/2000	6	1	1	29		3.33	0.00	2	2	23		8.00	0.00	1	1	24		4.00	0.00	0	0	25		0.00	0.00	3.83	10.78	1.64	85.64	0.00	0.00	0.00	na
4/26/2000	7	9	10	20		33.33	0.00	10	12	13		48.00	0.00	10	11	14		44.00	0.00	2	2	23		8.00	0.00	33.33	323.56	8.99	53.96	0.00	0.00	0.00	na
4/27/2000	8	0	10	20		33.33	0.00	4	16	9		64.00	0.00	7	18	7		72.00	0.00	1	3	22		12.00	0.00	45.33	771.56	13.89	61.27	0.00	0.00	0.00	na
4/28/2000	9	0	10	20		33.33	0.00	0	16	9		64.00	0.00	2	20	5		80.00	0.00	1	4	21		16.00	0.00	48.33	839.56	14.49	59.95	0.00	0.00	0.00	na
5/1/2000	12	0	10	20		33.33	0.00	0	16	9		64.00	0.00	1	21	4		84.00	0.00	1	5	20		20.00	0.00	50.33	843.11	14.52	57.69	0.00	0.00	0.00	na
5/2/2000	13	1	11	19		36.67	0.00	1	17	8		68.00	0.00	0	21	4		84.00	0.00	1	6	19		24.00	0.00	53.17	764.56	13.83	52.01	0.00	0.00	0.00	na
5/5/2000	16	1	12	18		40.00	0.00	1	18	7		72.00	0.00	1	22	3		88.00	0.00	4	10	15		40.00	0.00	60.00	576.00	12.00	40.00	0.00	0.00	0.00	na
5/8/2000	19	2	14	16		46.67	0.00	0	18	7		72.00	0.00	0	22	3		88.00	0.00	2	12	13		48.00	0.00	63.67	398.67	9.98	31.36	0.00	0.00	0.00	na
5/9/2000	20	6	20	10		66.67	0.00	0	18	7		72.00	0.00	0	22	3		88.00	0.00	5	17	8		68.00	0.00	73.67	96.44	4.91	13.33	0.00	0.00	0.00	na
5/11/2000	22	8	28	2		93.33	0.00	1	19	6		76.00	0.00	0	22	3		88.00	0.00	1	18	7		72.00	0.00	82.33	100.00	5.00	12.15	0.00	0.00	0.00	na
5/12/2000	23	1	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	0	18	7		72.00	0.00	83.17	127.22	5.64	13.56	0.00	0.00	0.00	na
5/15/2000	26	0	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	6	24	1		96.00	0.00	89.17	92.56	4.81	10.79	0.00	0.00	0.00	na
5/17/2000	28	0	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	0	24	1		96.00	0.00	89.17	92.56	4.81	10.79	0.00	0.00	0.00	na
5/19/2000	30	0	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	0	24	1		96.00	0.00	89.17	92.56	4.81	10.79	0.00	0.00	0.00	na
5/22/2000	33	0	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	0	24	1		96.00	0.00	89.17	92.56	4.81	10.79	0.00	0.00	0.00	na
5/23/2000	34	0	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	0	24	1		96.00	0.00	89.17	92.56	4.81	10.79	0.00	0.00	0.00	na
5/24/2000	35	0	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	0	24	1		96.00	0.00	89.17	92.56	4.81	10.79	0.00	0.00	0.00	na
5/25/2000	36	0	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	0	24	1		96.00	0.00	89.17	92.56	4.81	10.79	0.00	0.00	0.00	na
5/26/2000	37	0	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	0	24	1		96.00	0.00	89.17	92.56	4.81	10.79	0.00	0.00	0.00	na
5/30/2000	41	0	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	0	24	1		96.00	0.00	89.17	92.56	4.81	10.79	0.00	0.00	0.00	na
5/31/2000	42	0	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	0	24	1		96.00	0.00	89.17	92.56	4.81	10.79	0.00	0.00	0.00	na
6/1/2000	43	0	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	0	24	1		96.00	0.00	89.17	92.56	4.81	10.79	0.00	0.00	0.00	na
6/2/2000	44	0	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	0	24	1		96.00	0.00	89.17	92.56	4.81	10.79	0.00	0.00	0.00	na
6/5/2000	47	0	29	1		96.67	0.00	0	19	6		76.00	0.00	0	22	3		88.00	0.00	0	24	1		96.00	0.00	90.17	61.44	3.92	8.69	0.00	0.00	0.00	na
6/6/2000	48	0	29	1		96.67	0.00	0	20	5		80.00	0.00	1	23	2		92.00	0.00	0	24	1		96.00	0.00	91.17	59.67	3.86	8.47	0.00	0.00	0.00	na
6/8/2000	50	0	29	1		96.67	0.00	0	20	5		80.00	0.00	0	23	2		92.00	0.00	0	24	1		96.00	0.00	91.17	59.67	3.86	8.47	0.00	0.00	0.00	na
6/12/2000	54	0	29	1		96.67	0.00	0	20	5		80.00	0.00	1	24	1		96.00	0.00	0	24	1		96.00	0.00	92.17	65.89	4.06	8.81	0.00	0.00	0.00	na
6/13/2000	55	0	29	1		96.67	0.00	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	24	1		96.00	0.00	92.17	65.89	4.06	8.81	0.00	0.00	0.00	na
6/14/2000	56	0	29	1		96.67	0.00	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	24	1		96.00	0.00	92.17	65.89	4.06	8.81	0.00	0.00	0.00	na
6/15/2000	57	0	29	1		96.67	0.00	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	24	1		96.00	0.00	92.17	65.89	4.06	8.81	0.00	0.00	0.00	na
6/16/2000	58	0	29	1		96.67	0.00	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	24	1		96.00	0.00	92.17	65.89	4.06	8.81	0.00	0.00	0.00	na
6/19/2000	61	0	29	1		96.67	0.00	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	24	1		96.00	0.00	92.17	65.89	4.06	8.81	0.00	0.00	0.00	na
6/20/2000	62	0	29	1		96.67	0.00	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	24	1		96.00	0.00	92.17	65.89	4.06	8.81	0.00	0.00	0.00	na
6/21/2000	63	0	29	1		96.67	0.00	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	24	1		96.00	0.00	92.17	65.89	4.06	8.81	0.00	0.00	0.00	na
6/22/2000	64	0	29	1		96.67	0.00	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	24	1		96.00	0.00	92.17	65.89	4.06	8.81	0.00	0.00	0.00	na
6/23/2000	65	0	29	1		96.67	0.00	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	24	1		96.00	0.00	92.17	65.89	4.06	8.81	0.0			

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
SITE 36 (W-4), 0.46 mg/Kg SEDIMENT PCB

		EM01-1						EM01-2						EM01-3						EM01-4						CUMULATIVE MORTALITY STATISTICS				CUMULATIVE METAMORPH STATISTICS			
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)
8/15/2000	118	0	29	1	1	96.67	3.33	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	0.83	2.78	0.83	200.00
8/16/2000	119	0	29	1	1	96.67	3.33	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	0.83	2.78	0.83	200.00
8/17/2000	120	0	29	1	1	96.67	3.33	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	0.83	2.78	0.83	200.00
8/18/2000	121	0	29	1	1	96.67	3.33	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	0.83	2.78	0.83	200.00
8/21/2000	124	0	29	1	1	96.67	3.33	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	0.83	2.78	0.83	200.00
8/22/2000	125	0	29	1	1	96.67	3.33	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	0.83	2.78	0.83	200.00
8/23/2000	126	0	29	1	1	96.67	3.33	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	0.83	2.78	0.83	200.00
8/24/2000	127	0	29	1	1	96.67	3.33	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	0.83	2.78	0.83	200.00
8/25/2000	128	0	29	1	1	96.67	3.33	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	0.83	2.78	0.83	200.00
8/28/2000	131	0	29	1	1	96.67	3.33	0	20	5		80.00	0.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	0.83	2.78	0.83	200.00
8/29/2000	132	0	29	1	1	96.67	3.33	0	20	5	1	80.00	4.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	1.83	4.56	1.07	116.42
8/30/2000	133	0	29	1	1	96.67	3.33	0	20	5	1	80.00	4.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	1.83	4.56	1.07	116.42
8/31/2000	134	0	29	1	1	96.67	3.33	0	20	5	1	80.00	4.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	1.83	4.56	1.07	116.42
9/1/2000	135	0	29	1	1	96.67	3.33	0	20	5	1	80.00	4.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	93.17	80.11	4.48	9.61	1.83	4.56	1.07	116.42
9/5/2000	139	0	29	1	1	96.67	3.33	2	22	3	1	88.00	4.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	95.17	25.89	2.54	5.35	1.83	4.56	1.07	116.42
9/6/2000	140	0	29	1	1	96.67	3.33	0	22	3	1	88.00	4.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	95.17	25.89	2.54	5.35	1.83	4.56	1.07	116.42
9/7/2000	141	0	29	1	1	96.67	3.33	0	22	3	1	88.00	4.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	95.17	25.89	2.54	5.35	1.83	4.56	1.07	116.42
9/8/2000	142	0	29	1	1	96.67	3.33	0	22	3	1	88.00	4.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	95.17	25.89	2.54	5.35	1.83	4.56	1.07	116.42
9/11/2000	145	0	29	1	1	96.67	3.33	0	22	3	1	88.00	4.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	95.17	25.89	2.54	5.35	1.83	4.56	1.07	116.42
9/12/2000	146	0	29	1	1	96.67	3.33	0	22	3	1	88.00	4.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	95.17	25.89	2.54	5.35	1.83	4.56	1.07	116.42
9/13/2000	147	0	29	1	1	96.67	3.33	0	22	3	1	88.00	4.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	95.17	25.89	2.54	5.35	1.83	4.56	1.07	116.42
9/14/2000	148	0	29	1	1	96.67	3.33	0	22	3	1	88.00	4.00	0	24	1		96.00	0.00	0	25	0		100.00	0.00	95.17	25.89	2.54	5.35	1.83	4.56	1.07	116.42

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
SITE 36 (W-4), 0.46 mg/Kg SEDIMENT PCB

		EM02-1						EM02-2						EM02-3						EM02-4						CUMULATIVE				CUMULATIVE			
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)
4/19/2000	0	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na	
4/20/2000	1	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na	
4/21/2000	2	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na	
4/24/2000	5	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na	
4/25/2000	6	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na	
4/26/2000	7	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na	
4/27/2000	8	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na	
4/28/2000	9	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na	
5/1/2000	12	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na	
5/2/2000	13	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	1	1	24		4.00	0.00	1.00	4.00	1.00	200.00	0.00	0.00	0.00	na
5/5/2000	16	17	17	13		56.67	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	1	24		4.00	0.00	15.17	769.00	13.87	182.84	0.00	0.00	0.00	na
5/8/2000	19	13	30	0		100.00	0.00	0	0	25		0.00	0.00	2	2	23		8.00	0.00	3	4	21		16.00	0.00	31.00	2158.67	23.23	149.88	0.00	0.00	0.00	na
5/9/2000	20	0	30	0		100.00	0.00	6	6	19		24.00	0.00	0	2	23		8.00	0.00	0	4	21		16.00	0.00	37.00	1806.67	21.25	114.88	0.00	0.00	0.00	na
5/11/2000	22	0	30	0		100.00	0.00	16	22	3		88.00	0.00	5	7	18		28.00	0.00	0	4	21		16.00	0.00	58.00	1776.00	21.07	72.66	0.00	0.00	0.00	na
5/12/2000	23	0	30	0		100.00	0.00	0	22	3		88.00	0.00	10	17	8		68.00	0.00	1	5	20		20.00	0.00	69.00	1241.33	17.62	51.06	0.00	0.00	0.00	na
5/15/2000	26	0	30	0		100.00	0.00	0	22	3		88.00	0.00	2	19	6		76.00	0.00	9	14	11		56.00	0.00	80.00	352.00	9.38	23.45	0.00	0.00	0.00	na
5/17/2000	28	0	30	0		100.00	0.00	0	22	3		88.00	0.00	0	19	6		76.00	0.00	0	14	11		56.00	0.00	80.00	352.00	9.38	23.45	0.00	0.00	0.00	na
5/19/2000	30	0	30	0		100.00	0.00	0	22	3		88.00	0.00	0	19	6		76.00	0.00	0	14	11		56.00	0.00	80.00	352.00	9.38	23.45	0.00	0.00	0.00	na
5/22/2000	33	0	30	0		100.00	0.00	1	23	2		92.00	0.00	0	19	6		76.00	0.00	1	15	10		60.00	0.00	82.00	314.67	8.87	21.63	0.00	0.00	0.00	na
5/23/2000	34	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	19	6		76.00	0.00	0	15	10		60.00	0.00	82.00	314.67	8.87	21.63	0.00	0.00	0.00	na
5/24/2000	35	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	19	6		76.00	0.00	0	15	10		60.00	0.00	82.00	314.67	8.87	21.63	0.00	0.00	0.00	na
5/25/2000	36	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	19	6		76.00	0.00	0	15	10		60.00	0.00	82.00	314.67	8.87	21.63	0.00	0.00	0.00	na
5/26/2000	37	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	19	6		76.00	0.00	1	16	9		64.00	0.00	83.00	260.00	8.06	19.43	0.00	0.00	0.00	na
5/30/2000	41	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	19	6		76.00	0.00	5	21	4		84.00	0.00	88.00	106.67	5.16	11.74	0.00	0.00	0.00	na
5/31/2000	42	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	19	6		76.00	0.00	0	21	4		84.00	0.00	88.00	106.67	5.16	11.74	0.00	0.00	0.00	na
6/1/2000	43	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	19	6		76.00	0.00	0	21	4		84.00	0.00	88.00	106.67	5.16	11.74	0.00	0.00	0.00	na
6/2/2000	44	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	19	6		76.00	0.00	0	21	4		84.00	0.00	88.00	106.67	5.16	11.74	0.00	0.00	0.00	na
6/5/2000	47	0	30	0		100.00	0.00	0	23	2		92.00	0.00	1	20	5		80.00	0.00	0	21	4		84.00	0.00	89.00	78.67	4.43	9.97	0.00	0.00	0.00	na
6/6/2000	48	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	20	5		80.00	0.00	0	21	4		84.00	0.00	89.00	78.67	4.43	9.97	0.00	0.00	0.00	na
6/8/2000	50	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	20	5		80.00	0.00	0	21	4		84.00	0.00	89.00	78.67	4.43	9.97	0.00	0.00	0.00	na
6/12/2000	54	0	30	0		100.00	0.00	0	23	2		92.00	0.00	2	22	3		88.00	0.00	1	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
6/13/2000	55	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
6/14/2000	56	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
6/15/2000	57	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
6/16/2000	58	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
6/19/2000	61	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
6/20/2000	62	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
6/21/2000	63	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
6/22/2000	64	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
6/23/2000	65	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
6/26/2000	68	0</																															

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
SITE 36 (W-4), 0.46 mg/Kg SEDIMENT PCB

		EM02-1						EM02-2						EM02-3						EM02-4						CUMULATIVE MORTALITY STATISTICS				CUMULATIVE METAMORPH STATISTICS			
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)
8/15/2000	118	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
8/16/2000	119	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
8/17/2000	120	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
8/18/2000	121	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
8/21/2000	124	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
8/22/2000	125	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
8/23/2000	126	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
8/24/2000	127	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
8/25/2000	128	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
8/28/2000	131	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
8/29/2000	132	0	30	0		100.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	0	22	3		88.00	0.00	92.00	32.00	2.83	6.15	0.00	0.00	0.00	na
8/30/2000	133	0	30	0		100.00	0.00	1	24	1		96.00	0.00	1	23	2		92.00	0.00	0	22	3		88.00	0.00	94.00	26.67	2.58	5.49	0.00	0.00	0.00	na
8/31/2000	134	0	30	0		100.00	0.00	0	24	1		96.00	0.00	0	23	2		92.00	0.00	0	22	3		88.00	0.00	94.00	26.67	2.58	5.49	0.00	0.00	0.00	na
9/1/2000	135	0	30	0		100.00	0.00	0	24	1		96.00	0.00	0	23	2		92.00	0.00	1	23	2		92.00	0.00	95.00	14.67	1.91	4.03	0.00	0.00	0.00	na
9/5/2000	139	0	30	0		100.00	0.00	1	25	0		100.00	0.00	0	23	2		92.00	0.00	0	23	2		92.00	0.00	96.00	21.33	2.31	4.81	0.00	0.00	0.00	na
9/6/2000	140	0	30	0		100.00	0.00	0	25	0		100.00	0.00	0	23	2		92.00	0.00	0	23	2		92.00	0.00	96.00	21.33	2.31	4.81	0.00	0.00	0.00	na
9/7/2000	141	0	30	0		100.00	0.00	0	25	0		100.00	0.00	0	23	2		92.00	0.00	0	23	2		92.00	0.00	96.00	21.33	2.31	4.81	0.00	0.00	0.00	na
9/8/2000	142	0	30	0		100.00	0.00	0	25	0		100.00	0.00	0	23	2		92.00	0.00	0	23	2		92.00	0.00	96.00	21.33	2.31	4.81	0.00	0.00	0.00	na
9/11/2000	145	0	30	0		100.00	0.00	0	25	0		100.00	0.00	0	23	2		92.00	0.00	0	23	2		92.00	0.00	96.00	21.33	2.31	4.81	0.00	0.00	0.00	na
9/12/2000	146	0	30	0		100.00	0.00	0	25	0		100.00	0.00	0	23	2		92.00	0.00	0	23	2		92.00	0.00	96.00	21.33	2.31	4.81	0.00	0.00	0.00	na
9/13/2000	147	0	30	0		100.00	0.00	0	25	0		100.00	0.00	0	23	2		92.00	0.00	0	23	2		92.00	0.00	96.00	21.33	2.31	4.81	0.00	0.00	0.00	na
9/14/2000	148	0	30	0		100.00	0.00	0	25	0		100.00	0.00	0	23	2		92.00	0.00	0	23	2		92.00	0.00	96.00	21.33	2.31	4.81	0.00	0.00	0.00	na

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
 SITE 36 (W-4), 0.46 mg/Kg SEDIMENT PCB

COMBINED EGG MASSES

COMBINED LOS MODELS														MEAN				MEAN					
		NO.	CUMUL.	CUMUL.	CUMUL.	%	%			NO.	CUMUL.	CUMUL.	CUMUL.	%	%	MORTALITY STATISTICS				METAMORPH STATISTICS			
DATE	DAY	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)
4/19/2000	0															0.00	0.00	0.00	na	0.00	0.00	0.00	na
4/20/2000	1															0.00	0.00	0.00	na	0.00	0.00	0.00	na
4/21/2000	2															0.00	0.00	0.00	na	0.00	0.00	0.00	na
4/24/2000	5															0.00	0.00	0.00	na	0.00	0.00	0.00	na
4/25/2000	6															1.92	7.35	1.92	141.42	0.00	0.00	0.00	na
4/26/2000	7															16.67	555.56	16.67	141.42	0.00	0.00	0.00	na
4/27/2000	8															22.67	1027.56	22.67	141.42	0.00	0.00	0.00	na
4/28/2000	9															24.17	1168.06	24.17	141.42	0.00	0.00	0.00	na
5/1/2000	12															25.17	1266.72	25.17	141.42	0.00	0.00	0.00	na
5/2/2000	13															27.08	1360.68	26.08	136.20	0.00	0.00	0.00	na
5/5/2000	16															37.58	1005.01	22.42	84.35	0.00	0.00	0.00	na
5/8/2000	19															47.33	533.56	16.33	48.80	0.00	0.00	0.00	na
5/9/2000	20															55.33	672.22	18.33	46.86	0.00	0.00	0.00	na
5/11/2000	22															70.17	296.06	12.17	24.52	0.00	0.00	0.00	na
5/12/2000	23															76.08	100.35	7.08	13.17	0.00	0.00	0.00	na
5/15/2000	26															84.58	42.01	4.58	7.66	0.00	0.00	0.00	na
5/17/2000	28															84.58	42.01	4.58	7.66	0.00	0.00	0.00	na
5/19/2000	30															84.58	42.01	4.58	7.66	0.00	0.00	0.00	na
5/22/2000	33															85.58	25.68	3.58	5.92	0.00	0.00	0.00	na
5/23/2000	34															85.58	25.68	3.58	5.92	0.00	0.00	0.00	na
5/24/2000	35															85.58	25.68	3.58	5.92	0.00	0.00	0.00	na
5/25/2000	36															85.58	25.68	3.58	5.92	0.00	0.00	0.00	na
5/26/2000	37															86.08	19.01	3.08	5.07	0.00	0.00	0.00	na
5/30/2000	41															88.58	0.68	0.58	0.93	0.00	0.00	0.00	na
5/31/2000	42															88.58	0.68	0.58	0.93	0.00	0.00	0.00	na
6/1/2000	43															88.58	0.68	0.58	0.93	0.00	0.00	0.00	na
6/2/2000	44															88.58	0.68	0.58	0.93	0.00	0.00	0.00	na
6/5/2000	47															89.58	0.68	0.58	0.92	0.00	0.00	0.00	na
6/6/2000	48															90.08	2.35	1.08	1.70	0.00	0.00	0.00	na
6/8/2000	50															90.08	2.35	1.08	1.70	0.00	0.00	0.00	na
6/12/2000	54															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/13/2000	55															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/14/2000	56															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/15/2000	57															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/16/2000	58															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/19/2000	61															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/20/2000	62															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/21/2000	63															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/22/2000	64															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/23/2000	65															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/26/2000	68															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/27/2000	69															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/28/2000	70															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/29/2000	71															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
6/30/2000	72															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
7/5/2000	77															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
7/6/2000	78															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
7/7/2000	79															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
7/10/2000	82															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
7/11/2000	83															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
7/12/2000	84															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
7/13/2000	85															92.08	0.01	0.08	0.13	0.00	0.00	0.00	na
7/17/2000	89															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
7/18/2000	90															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
7/19/2000	91															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
7/20/2000	92															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
7/24/2000	96															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
7/25/2000	97															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
7/26/2000	98															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
7/27/2000	99															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
7/28/2000	100															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
7/31/2000	103															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
8/1/2000	104															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
8/3/2000	106															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
8/4/2000	107															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
8/7/2000	110															92.58	0.68	0.58	0.89	0.00	0.00	0.00	na
8/8/2000	111															92.58	0.68	0.58	0.89	0.42	0.35	0.42	141.42
8/9/2000	112															92.58	0.68	0.58	0.89	0.42	0.35	0.42	141.42
8/10/2000	113															92.58	0.68	0.58	0.89	0.42	0.35	0.42	141.42
8/11/2000	114															92.58	0.68	0.58	0.89	0.42	0.35	0.42	141.42
8/14/2000	117															92.58	0.68	0.58	0.89	0.42	0.35	0.42	141.42

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
SITE 36 (W-4), 0.46 mg/Kg SEDIMENT PCB

COMBINED EGG MASSES																																	
																				MEAN				MEAN									
DATE	DAY	NO.	CUMUL.	CUMUL.	CUMUL.	%	%	NO.	CUMUL.	CUMUL.	CUMUL.	%	%	NO.	CUMUL.	CUMUL.	CUMUL.	%	%	NO.	CUMUL.	CUMUL.	CUMUL.	%	%	MORTALITY STATISTICS				METAMORPH STATISTICS			
		DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)
8/15/2000	118																									92.58	0.68	0.29	0.89	0.42	0.35	0.21	141.42
8/16/2000	119																									92.58	0.68	0.29	0.89	0.42	0.35	0.21	141.42
8/17/2000	120																									92.58	0.68	0.29	0.89	0.42	0.35	0.21	141.42
8/18/2000	121																									92.58	0.68	0.29	0.89	0.42	0.35	0.21	141.42
8/21/2000	124																									92.58	0.68	0.29	0.89	0.42	0.35	0.21	141.42
8/22/2000	125																									92.58	0.68	0.29	0.89	0.42	0.35	0.21	141.42
8/23/2000	126																									92.58	0.68	0.29	0.89	0.42	0.35	0.21	141.42
8/24/2000	127																									92.58	0.68	0.29	0.89	0.42	0.35	0.21	141.42
8/25/2000	128																									92.58	0.68	0.29	0.89	0.42	0.35	0.21	141.42
8/28/2000	131																									92.58	0.68	0.29	0.89	0.42	0.35	0.21	141.42
8/29/2000	132																									92.58	0.68	0.29	0.89	0.92	1.68	0.46	141.42
8/30/2000	133																									93.58	0.35	0.21	0.63	0.92	1.68	0.46	141.42
8/31/2000	134																									93.58	0.35	0.21	0.63	0.92	1.68	0.46	141.42
9/1/2000	135																									94.08	1.68	0.46	1.38	0.92	1.68	0.46	141.42
9/5/2000	139																									95.58	0.35	0.21	0.62	0.92	1.68	0.46	141.42
9/6/2000	140																									95.58	0.35	0.21	0.62	0.92	1.68	0.46	141.42
9/7/2000	141																									95.58	0.35	0.21	0.62	0.92	1.68	0.46	141.42
9/8/2000	142																									95.58	0.35	0.21	0.62	0.92	1.68	0.46	141.42
9/11/2000	145																									95.58	0.35	0.21	0.62	0.92	1.68	0.46	141.42
9/12/2000	146																									95.58	0.35	0.21	0.62	0.92	1.68	0.46	141.42
9/13/2000	147																									95.58	0.35	0.21	0.62	0.92	1.68	0.46	141.42
9/14/2000	148																									95.58	0.35	0.21	0.62	0.92	1.68	0.46	141.42

HOUSATONIC RIVER PROJECT
***RANA pipiens* DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA**
SITE 37 (EW-3), 30.0 mg/Kg SEDIMENT PCB

DATE	DAY	NO. DEAD	CUMUL. DEAD	TP01-1				CUMULATIVE MORTALITY STATISTICS				CUMULATIVE METAMORPH STATISTICS			
				CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)
5/9/2000	0	0	0	10		0.00	0.00	0.00	na	na	na	0.00	na	na	na
5/11/2000	2	0	0	10		0.00	0.00	0.00	na	na	na	0.00	na	na	na
5/12/2000	3	1	1	9		10.00	0.00	10.00	na	na	na	0.00	na	na	na
5/15/2000	6	0	1	9		10.00	0.00	10.00	na	na	na	0.00	na	na	na
5/17/2000	8	0	1	9		10.00	0.00	10.00	na	na	na	0.00	na	na	na
5/19/2000	10	0	1	9		10.00	0.00	10.00	na	na	na	0.00	na	na	na
5/22/2000	13	0	1	9		10.00	0.00	10.00	na	na	na	0.00	na	na	na
5/23/2000	14	0	1	9		10.00	0.00	10.00	na	na	na	0.00	na	na	na
5/24/2000	15	0	1	9		10.00	0.00	10.00	na	na	na	0.00	na	na	na
5/25/2000	16	0	1	9		10.00	0.00	10.00	na	na	na	0.00	na	na	na
5/26/2000	17	1	2	8		20.00	0.00	20.00	na	na	na	0.00	na	na	na
5/30/2000	21	5	7	3		70.00	0.00	70.00	na	na	na	0.00	na	na	na
5/31/2000	22	0	7	3		70.00	0.00	70.00	na	na	na	0.00	na	na	na
6/1/2000	23	2	9	1		90.00	0.00	90.00	na	na	na	0.00	na	na	na
6/2/2000	24	0	9	1		90.00	0.00	90.00	na	na	na	0.00	na	na	na
6/5/2000	27	0	9	1		90.00	0.00	90.00	na	na	na	0.00	na	na	na
6/6/2000	28	1	10	0		100.00	0.00	100.00	na	na	na	0.00	na	na	na

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
SITE 39 (W-1), 0.15 mg/Kg SEDIMENT PCB

		EM01-1						EM01-2						EM01-3						EM01-4						CUMULATIVE				CUMULATIVE							
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)				
4/25/2000	0	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
4/26/2000	1	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
4/27/2000	2	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
4/28/2000	3	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
5/1/2000	6	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
5/2/2000	7	0	0	30		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0	0	25		0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
5/5/2000	10	0	0	30		0.00	0.00	0	0	25		0.00	0.00	3	3	22		12.00	0.00	6	6	19		24.00	0.00	9.00	132.00	5.74	127.66	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/8/2000	13	0	0	30		0.00	0.00	0	0	25		0.00	0.00	5	8	17		32.00	0.00	4	10	15		40.00	0.00	18.00	442.67	10.52	116.89	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/9/2000	14	13	13	17		43.33	0.00	13	13	12		52.00	0.00	6	14	11		56.00	0.00	0	10	15		40.00	0.00	47.83	55.22	3.72	15.54	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/11/2000	16	8	21	9		70.00	0.00	8	21	4		84.00	0.00	3	17	8		68.00	0.00	0	10	15		40.00	0.00	65.50	339.67	9.22	28.14	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/12/2000	17	1	22	8		73.33	0.00	1	22	3		88.00	0.00	3	20	5		80.00	0.00	1	11	14		44.00	0.00	71.33	368.00	9.59	26.89	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/15/2000	20	1	23	7		76.67	0.00	3	25	0		100.00	0.00	4	24	1		96.00	0.00	0	11	14		44.00	0.00	79.17	653.44	12.78	32.29	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/17/2000	22	2	25	5		83.33	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	2	13	12		52.00	0.00	82.83	473.00	10.87	26.26	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/19/2000	24	0	25	5		83.33	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	13	12		52.00	0.00	82.83	473.00	10.87	26.26	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/22/2000	27	0	25	5		83.33	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	13	12		52.00	0.00	82.83	473.00	10.87	26.26	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/23/2000	28	1	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	13	12		52.00	0.00	83.67	476.89	10.92	26.10	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/24/2000	29	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	13	12		52.00	0.00	83.67	476.89	10.92	26.10	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/25/2000	30	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	13	12		52.00	0.00	83.67	476.89	10.92	26.10	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/26/2000	31	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	13	12		52.00	0.00	83.67	476.89	10.92	26.10	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/30/2000	35	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	1	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/31/2000	36	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/1/2000	37	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/2/2000	38	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/5/2000	41	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/6/2000	42	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/8/2000	44	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/12/2000	48	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/13/2000	49	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/14/2000	50	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/15/2000	51	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/16/2000	52	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/19/2000	55	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/20/2000	56	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/21/2000	57	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/22/2000	58	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	24	1		96.00	0.00	0	14	11		56.00	0.00	84.67	396.44	9.96	23.52	0.00	0.00	0.00	na	0.00	0.00	0.00	na
6/23/2000	59	0																																			

HOUSATONIC RIVER PROJECT
***RANA pipiens* DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA**
SITE 39 (W-1), 0.15 mg/Kg SEDIMENT PCB

DATE	DAY	EM01-1						EM01-2						EM01-3						EM01-4						CUMULATIVE MORTALITY STATISTICS				CUMULATIVE METAMORPH STATISTICS			
		NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)
8/17/2000	114	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	15	10		60.00	0.00	86.67	355.56	9.43	21.76	0.00	0.00	0.00	na
8/18/2000	115	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	15	10		60.00	0.00	86.67	355.56	9.43	21.76	0.00	0.00	0.00	na
8/21/2000	118	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	15	10		60.00	0.00	86.67	355.56	9.43	21.76	0.00	0.00	0.00	na
8/22/2000	119	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	1	16	9		64.00	0.00	87.67	288.44	8.49	19.37	0.00	0.00	0.00	na
8/23/2000	120	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	2	18	7		72.00	0.00	89.67	178.22	6.67	14.89	0.00	0.00	0.00	na
8/24/2000	121	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	18	7		72.00	0.00	89.67	178.22	6.67	14.89	0.00	0.00	0.00	na
8/25/2000	122	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	18	7		72.00	0.00	89.67	178.22	6.67	14.89	0.00	0.00	0.00	na
8/28/2000	125	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	18	7		72.00	0.00	89.67	178.22	6.67	14.89	0.00	0.00	0.00	na
8/29/2000	126	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	18	7		72.00	0.00	89.67	178.22	6.67	14.89	0.00	0.00	0.00	na
8/30/2000	127	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	18	7		72.00	0.00	89.67	178.22	6.67	14.89	0.00	0.00	0.00	na
8/31/2000	128	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	18	7		72.00	0.00	89.67	178.22	6.67	14.89	0.00	0.00	0.00	na
9/1/2000	129	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	18	7		72.00	0.00	89.67	178.22	6.67	14.89	0.00	0.00	0.00	na
9/5/2000	133	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	1	19	6		76.00	0.00	90.67	135.11	5.81	12.82	0.00	0.00	0.00	na
9/6/2000	134	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	19	6		76.00	0.00	90.67	135.11	5.81	12.82	0.00	0.00	0.00	na
9/7/2000	135	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	19	6		76.00	0.00	90.67	135.11	5.81	12.82	0.00	0.00	0.00	na
9/8/2000	136	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	1	20	5		80.00	0.00	91.67	100.00	5.00	10.91	0.00	0.00	0.00	na
9/11/2000	139	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	20	5		80.00	0.00	91.67	100.00	5.00	10.91	0.00	0.00	0.00	na
9/12/2000	140	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	20	5		80.00	0.00	91.67	100.00	5.00	10.91	0.00	0.00	0.00	na
9/13/2000	141	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	20	5		80.00	0.00	91.67	100.00	5.00	10.91	0.00	0.00	0.00	na
9/14/2000	142	0	26	4		86.67	0.00	0	25	0		100.00	0.00	0	25	0		100.00	0.00	0	20	5		80.00	0.00	91.67	100.00	5.00	10.91	0.00	0.00	0.00	na

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
R3 REFERENCE LARVAE IN REFERENCE SITE 40 (MP), 0.04 mg/Kg SEDIMENT PCB

EM01-1								EM01-2								EM01-3								EM01-4								CUMULATIVE				CUMULATIVE			
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)						
5/24/2000	0	0	0	20		0.00	0.00	0	0	20		0.00	0.00	0	0	20		0.00	0.00	0	0	20		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na					
5/25/2000	1	0	0	20		0.00	0.00	1	1	19		5.00	0.00	3	3	17		15.00	0.00	1	1	19		5.00	0.00	6.25	39.58	3.15	100.66	0.00	0.00	0.00	0.00	na					
5/26/2000	2	0	0	20		0.00	0.00	0	1	19		5.00	0.00	0	3	17		15.00	0.00	1	2	18		10.00	0.00	7.50	41.67	3.23	86.07	0.00	0.00	0.00	0.00	na					
5/30/2000	6	0	0	20		0.00	0.00	0	1	19		5.00	0.00	0	3	17		15.00	0.00	0	2	18		10.00	0.00	7.50	41.67	3.23	86.07	0.00	0.00	0.00	0.00	na					
5/31/2000	7	0	0	20		0.00	0.00	1	2	18		10.00	0.00	0	3	17		15.00	0.00	1	3	17		15.00	0.00	10.00	50.00	3.54	70.71	0.00	0.00	0.00	0.00	na					
6/1/2000	8	0	0	20		0.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	10.00	50.00	3.54	70.71	0.00	0.00	0.00	0.00	na					
6/2/2000	9	0	0	20		0.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	10.00	50.00	3.54	70.71	0.00	0.00	0.00	0.00	na					
6/5/2000	12	0	0	20		0.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	10.00	50.00	3.54	70.71	0.00	0.00	0.00	0.00	na					
6/6/2000	13	0	0	20		0.00	0.00	1	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	0.00	na					
6/8/2000	15	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	0.00	na					
6/9/2000	16	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	0.00	na					
6/12/2000	19	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	0.00	na					
6/13/2000	20	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	0.00	na					
6/14/2000	21	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	0.00	na					
6/15/2000	22	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	0.00	na					
6/16/2000	23	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	0.00	na					
6/19/2000	26	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	0.00	na					
6/20/2000	27	0	0	20		0.00	0.00	1	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	0.00	na					
6/21/2000	28	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	0.00	na					
6/22/2000	29	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	0.00	na					
6/23/2000	30	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	0.00	na					
6/26/2000	33	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	0.00	na					
6/27/2000	34	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	0.00	na					
6/28/2000	35	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	0.00	na					
6/29/2000	36	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	0.00	na					
6/30/2000	37	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	0.00	na					
7/5/2000	42	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	1	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	0.00	na					
7/6/2000	43	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	0.00	na					
7/10/2000	47	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	0.00	na					
7/11/2000	48	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	0.00	na					
7/12/2000	49	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	0.00	na					
7/13/2000	50	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	0.00	na					
7/17/2000	54	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	0.00	na					
7/18/2000	55	5	5	15		25.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	20.00	16.67	2.04	20.41	0.00	0.00	0.00	0.00	na					
7/19/2000	56	0	5	15		25.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	20.00	16.67	2.04	20.41	0.00	0.00	0.00	0.00	na					
7/20/2000	57	1	6	14		30.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	21.25	39.58	3.15	29.61	0.00	0.00	0.00	0.00	na					
7/21/2000	58	0	6	14		30.00	0.00	0	4	16		20.00	0.00	1	4	16		20.00	0.00	0	4	16		20.00	0.00	22.50	25.00	2.50	22.22	0.00	0.00	0.00	0.00	na					
7/24/2000	61	0	6	14		30.00	0.00	0	4	16		20.00	0.00	0	4	16		20.00	0.00	0	4	16		20.00	0.00	22.50	25.00	2.50	22.22	0.00	0.00	0.00	0.00	na					
7/25/2000	62	0	6	14		30.00	0.00	0	4	16		20.00	0.00	0	4	16		20.00	0.00	0	4	16		20.00	0.00	22.50	25.00	2.50	22.22	0.00	0.00	0.00							

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
R3 REFERENCE LARVAE IN REFERENCE SITE 40 (MP), 0.04 mg/Kg SEDIMENT PCB

EM02-1								EM02-2								EM02-3								EM02-4								CUMULATIVE				CUMULATIVE			
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)						
5/24/2000	0	0	0	20	0.00	0.00		0	0	20	0.00	0.00		0	0	20	0.00	0.00		0	0	20	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na						
5/25/2000	1	1	1	19	5.00	0.00		1	1	19	5.00	0.00		0	0	20	0.00	0.00		0	0	20	0.00	0.00	2.50	8.33	1.44	115.47	0.00	0.00	0.00	na							
5/26/2000	2	1	2	18	10.00	0.00		1	1	19	5.00	0.00		1	1	19	5.00	0.00		1	1	19	5.00	0.00	6.25	6.25	1.25	40.00	0.00	0.00	0.00	na							
5/30/2000	6	1	3	17	15.00	0.00		1	1	19	5.00	0.00		1	2	18	10.00	0.00		0	1	19	5.00	0.00	8.75	22.92	2.39	54.71	0.00	0.00	0.00	na							
5/31/2000	7	1	4	16	20.00	0.00		1	2	18	10.00	0.00		1	3	17	15.00	0.00		0	1	19	5.00	0.00	12.50	41.67	3.23	51.64	0.00	0.00	0.00	na							
6/1/2000	8	0	4	16	20.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	12.50	41.67	3.23	51.64	0.00	0.00	0.00	na							
6/2/2000	9	0	4	16	20.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	12.50	41.67	3.23	51.64	0.00	0.00	0.00	na							
6/5/2000	12	0	4	16	20.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	12.50	41.67	3.23	51.64	0.00	0.00	0.00	na							
6/6/2000	13	1	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/8/2000	15	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/9/2000	16	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/12/2000	19	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/13/2000	20	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/14/2000	21	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/15/2000	22	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/16/2000	23	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/19/2000	26	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/20/2000	27	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/21/2000	28	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/22/2000	29	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/23/2000	30	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/26/2000	33	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na							
6/27/2000	34	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		1	2	18	10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na							
6/28/2000	35	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na							
6/29/2000	36	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na							
6/30/2000	37	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na							
7/5/2000	42	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na							
7/6/2000	43	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na							
7/10/2000	47	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na							
7/11/2000	48	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na							
7/12/2000	49	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na							
7/13/2000	50	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na							
7/17/2000	54	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na							
7/18/2000	55	0	5	15	25.00	0.00		0	2	18	10.00	0.00		1	4	16	20.00	0.00		0	2	18	10.00	0.00	16.25	56.25	3.75	46.15	0.00	0.00	0.00	na							
7/19/2000	56	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	4	16	20.00	0.00		0	2	18	10.00	0.00	16.25	56.25	3.75	46.15	0.00	0.00	0.00	na							
7/20/2000	57	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	4	16	20.00	0.00		0	2	18	10.00	0.00	16.25	56.25	3.75	46.15	0.00	0.00	0.00	na							
7/21/2000	58	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	4	16	20.00	0.00		0	2	18	10.00	0.00	16.25	56.25	3.75	46.15	0.00	0.00	0.00	na							
7/24/2000	61	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	4	16	20.00	0.00		0	2	18	10.00	0.00	16.25	56.25	3.75	46.15	0.00	0.00	0.00	na							
7/25/2000	62	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	4	16	20.00	0.00		0	2	18	10.00	0.00	16.25	56.25	3.75	46.15	0.00	0.00	0.00	na							
7/26/2000	63	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	4	16	20.00	0.00		0	2	18	10.00	0.00	16.25	56.25	3.75	46.15	0.00	0.00	0.00	na							
7/27/2000	64	0	5	15	25.00	0.00		0	2	18	10.00	0.00		0	4	16	20.00	0.00		0	2	18	10.00	0.00	16.25	56.25	3.75												

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
R3 REFERENCE LARVAE IN REFERENCE SITE 40 (MP), 0.04 mg/Kg SEDIMENT PCB

COMBINED EGG MASS STATISTICS																												
																				MEAN MORTALITY STATISTICS				MEAN METAMORPH STATISTICS				
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)	
5/24/2000	0																				0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/25/2000	1																				4.38	7.03	1.88	60.61	0.00	0.00	0.00	na
5/26/2000	2																				6.88	0.78	0.63	12.86	0.00	0.00	0.00	na
5/30/2000	6																				8.13	0.78	0.63	10.88	0.00	0.00	0.00	na
5/31/2000	7																				11.25	3.13	1.25	15.71	0.00	0.00	0.00	na
6/1/2000	8																				11.25	3.13	1.25	15.71	0.00	0.00	0.00	na
6/2/2000	9																				11.25	3.13	1.25	15.71	0.00	0.00	0.00	na
6/5/2000	12																				11.25	3.13	1.25	15.71	0.00	0.00	0.00	na
6/6/2000	13																				12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/8/2000	15																				12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/9/2000	16																				12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/12/2000	19																				12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/13/2000	20																				12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/14/2000	21																				12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/15/2000	22																				12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/16/2000	23																				12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/19/2000	26																				12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/20/2000	27																				13.13	0.78	0.63	6.73	0.00	0.00	0.00	na
6/21/2000	28																				13.13	0.78	0.63	6.73	0.00	0.00	0.00	na
6/22/2000	29																				13.13	0.78	0.63	6.73	0.00	0.00	0.00	na
6/23/2000	30																				13.13	0.78	0.63	6.73	0.00	0.00	0.00	na
6/26/2000	33																				13.13	0.78	0.63	6.73	0.00	0.00	0.00	na
6/27/2000	34																				13.75	3.13	1.25	12.86	0.00	0.00	0.00	na
6/28/2000	35																				13.75	3.13	1.25	12.86	0.00	0.00	0.00	na
6/29/2000	36																				13.75	3.13	1.25	12.86	0.00	0.00	0.00	na
6/30/2000	37																				13.75	3.13	1.25	12.86	0.00	0.00	0.00	na
7/5/2000	42																				14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/6/2000	43																				14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/10/2000	47																				14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/11/2000	48																				14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/12/2000	49																				14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/13/2000	50																				14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/17/2000	54																				14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/18/2000	55																				18.13	7.03	1.88	14.63	0.00	0.00	0.00	na
7/19/2000	56																				18.13	7.03	1.88	14.63	0.00	0.00	0.00	na
7/20/2000	57																				18.75	12.50	2.50	18.86	0.00	0.00	0.00	na
7/21/2000	58																				19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
7/24/2000	61																				19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
7/25/2000	62																				19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
7/26/2000	63																				19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
7/27/2000	64																				19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
7/28/2000	65																				19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
7/31/2000	68																				19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
8/1/2000	69																				19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
8/3/2000	71																				20.00	28.13	3.75	26.52	0.00	0.00	0.00	na
8/7/2000	75																				20.00	28.13	3.75	26.52	0.00	0.00	0.00	na
8/8/2000	76																				21.88	38.28	4.38	28.28	0.00	0.00	0.00	na
8/9/2000	77																				21.88	38.28	4.38	28.28	0.00	0.00	0.00	na
8/10/2000	78																				21.88	38.28	4.38	28.28	0.00	0.00	0.00	na
8/11/2000	79																				21.88	38.28	4.38	28.28	0.00	0.00	0.00	na
8/14/2000	82																				21.88	38.28	4.38	28.28	0.00	0.00	0.00	na
8/15/2000	83																				22.50	50.00	5.00	31.43	0.00	0.00	0.00	na
8/16/2000	84																				22.50	50.00	5.00	31.43	2.50	0.00	0.00	0.00
8/17/2000	85																				22.50	50.00	5.00	31.43	2.50	0.00	0.00	0.00
8/18/2000	86																				22.50	50.00	5.00	31.43	2.50	0.00	0.00	0.00
8/21/2000	89																				23.13	38.28	4.38	26.76	2.50	0.00	0.00	0.00
8/22/2000	90																				23.13	38.28	4.38	26.76	2.50	0.00	0.00	0.00
8/23/2000	91																				23.75	28.13	3.75	22.33	3.75	3.13	1.25	47.14
8/24/2000	92																				23.75	28.13	3.75	22.33	3.75	3.13	1.25	47.14
8/25/2000	93																				23.75	28.13	3.75	22.33	3.75	3.13	1.25	47.14
8/28/2000	96																				25.00	28.13	3.75	21.21	5.63	7.03	1.88	47.14
9/10/2000	109																				43.75	3.13	1.25	4.04	5.63	7.03	1.88	47.14
9/11/2000	110																				43.75	3.13	1.25	4.04	5.63	7.03	1.88	47.14
9/12/2000	111																				43.75	3.13	1.25	4.04	5.63	7.03	1.88	47.14
9/13/2000	112																				43.75	3.13	1.25	4.04	5.63	7.03	1.88	47.14
9/14/2000	113																				43.75	3.13	1.25	4.04	5.63	7.03	1.88	47.14

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000 METAMORPH DATA
R3 REFERENCE LARVAE IN DECHLORINATED (Aged) TAP WATER

FINAL METAMORPH DATA OF ADDITIONAL REFERENCE SPECIMENS CULTURED IN DECHLORINATED TAP WATER

Composited EM01/EM02-1			Composited EM01/EM02-2			Composited EM01/EM02-3			Composited EM01/EM02-4			CUMULATIVE METAMORPH STATISTICS			
Total Number	Number Metamorphosed	% Metamorphosed	Total Number	Number Metamorphosed	% Metamorphosed	Total Number	Number Metamorphosed	% Metamorphosed	Total Number	Number Metamorphosed	% Metamorphosed	MEAN %	VAR (S2)	SEM	CV (%)
40	20	50.00	40	28	70.00	40	31	77.50	40	21	52.50	62.50	179.17	6.69	21.42

HOUSATONIC RIVER PROJECT
***RANA pipiens* DEVELOPMENTAL STUDY 2000**
STAGE/MALFORMATION DATA SUMMARY FOR FIGURES

% MALFORMED BY SITE AND STUDY DAY

Site W-7a (18.0 mg/Kg Sed PCB) Reps=4, 105 Days*				
DAY	STAGE	% MAL.	SEM	EVENT
0	20	15.67	4.91	1
7	20	16.83	3.30	2
13	20	18.67	3.13	3
24	21	15.00	3.00	4
31	21	10.33	4.23	5
36	22	10.00	3.46	6
49	22	6.33	2.33	7
71	23	6.67	0.94	8
105	27	6.67	0.94	9
Grand Means:		11.80	2.41	

Site W-6 (42.0 mg/Kg Sed PCB) Reps=4, 91 Days*				
DAY	STAGE	% MAL	SEM	EVENT
0	20	20.43	1.69	1
10	21	23.43	2.88	2
17	21	21.43	2.50	3
22	22	9.57	1.23	4
35	22	9.57	1.23	5
57	23	6.90	1.46	6
91	27	8.35	2.62	7
Grand Means:		14.24	3.58	

Site W-4 (0.46 mg/Kg Sed PCB) Reps=8, 111 Days*				
DAY	STAGE	% MAL.	SEM	EVENT
0	20	2.83	0.83	1
6	21	2.42	0.42	2
13	22	1.00	0.50	3
19	23	0.67	0.33	4
30	24	0.00	0.00	5
37	24	0.00	0.00	6
42	24	0.00	0.00	7
55	26	0.00	0.00	8
77	28	0.00	0.00	9
111	37	0.00	0.00	10
Grand Means:		0.69	0.38	

Site EW-3 (30.0 mg/Kg Sed PCB) Reps=1, 22 Days*				
DAY	STAGE	% MAL	SEM	EVENT
0	20	30.00	na	1
10	21	50.00	na	2
17	21	40.00	na	3
22	22	30.00	na	4
Grand Means:		37.50	9.57	

Site W-1 (0.15 mg/Kg Sed PCB) Reps=4, 105 Days*				
DAY	STAGE	% MAL.	SEM	EVENT
0	21	1.83	1.07	1
7	22	1.83	1.07	2
24	23	0.00	na	3
31	23	10.22	7.15	4
36	24	1.33	1.33	5
49	25	0.00	na	6
71	27	0.00	na	7
105	40	0.00	na	8
Grand Means:		1.90	1.73	

REFERENCE SITE DATA SHARED WITH CROSSOVER STUDY

R3 in Site MP (0.04 mg/Kg Sed PCB) Reps=8, 76 Days*				
DAY	STAGE	% MAL	SEM	EVENT
0	20	0.00	0.00	1
7	23	0.00	0.00	2
20	25	0.00	0.00	3
42	29	1.25	0.00	4
48	30	16.88	13.13	5
76	38	2.50	2.50	6
Grand Means:		3.44	2.35	

*test duration.

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
SITE 34 (W-7a) 18.0 mg/Kg SEDIMENT PCB

STAGE 20, 4/25/2000, DAY 0

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	30	8	26.67	3	4		2	1							
EM01-2	25	25	3	12.00	2	2			1							
EM01-3	25	25	1	4.00	1				1							
EM01-4	25	25	5	20.00	4	3			3					1		
Total:	105	105	17		10	9	0	2	6	0	0	0	0	1	0	0
Means:				15.67	9.50	8.33	0.00	1.67	5.83	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Var (S2)				96.44	1.67	1.00	na	na	1.00	na	na	na	na	na	na	na
SEM				4.91	0.65	0.58	na	na	0.50	na	na	na	na	na	na	na
CV (%)				62.68	13.59	12.00	na	na	17.14	na	na	na	na	na	na	na

STAGE 20, 5/2/2000, DAY 7

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	30	7	23.33	5	3		2	3							
EM01-2	25	25	4	16.00	3	2		1	1							
EM01-3	25	25	2	8.00	2	1										
EM01-4	25	25	5	20.00	4	3		3	2				1			
Total:	105	105	18		14	9	0	6	6	0	0	0	0	1	0	0
Means (based on initial larval count):				16.83	13.17	8.50	0.00	5.67	5.50	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Var (S2)				43.67	1.67	0.92	na	1.00	1.00	na	na	na	na	na	na	na
SEM				3.30	0.65	0.48	na	0.58	0.58	na	na	na	na	na	na	na
CV (%)				39.26	9.81	11.26	na	17.65	18.18	na	na	na	na	na	na	na

STAGE 20, 5/8/2000, DAY 13

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	30	8	26.67	5	4			4		2			1		
EM01-2	25	24	4	16.00	1	2			4		2					
EM01-3	25	24	3	12.00	2	3			1							
EM01-4	25	24	5	20.00	4	3			3		2			1		
Total:	105	102	20		12	12	0	0	12	0	6	0	0	2	0	0
Means (based on initial larval count):				18.67	11.17	11.33	0.00	0.00	11.33	0.00	5.67	0.00	0.00	1.83	0.00	0.00
Var (S2)				39.11	3.33	0.67	na	na	2.00	na	0.00	na	na	0.00	na	na
SEM				3.13	0.91	0.41	na	na	0.71	na	0.00	na	na	0.00	na	na
CV (%)				33.50	16.35	7.20	na	na	12.48	na	0.00	na	na	0.00	na	na

STAGE 21, 5/19/2000, DAY 24

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	14	6	20.00	3	6	1	2	3							
EM01-2	25	7	2	8.00	1	2			1							
EM01-3	25	13	3	12.00	2	3			2					1		
EM01-4	25	14	5	20.00	3	3	1		1		1			2		
Total:	105	48	16		9	14	2	2	7	0	1	0	0	3	0	0
Means (based on initial larval count):				15.00	8.50	13.00	1.83	1.67	6.50	0.00	1.00	0.00	0.00	3.00	0.00	0.00
Var (S2)				36.00	0.92	3.00	0.00	na	0.92	na	na	na	na	0.50	na	na
SEM				3.00	0.48	0.87	0.00	na	0.48	na	na	na	na	0.50	na	na
CV (%)				40.00	11.26	13.32	0.00	na	14.73	na	na	na	na	23.57	na	na

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
SITE 34 (W-7a) 18.0 mg/Kg SEDIMENT PCB

STAGE 21, 5/26/2000, DAY 31

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	13	4	13.33	2	4			2							
EM01-2	25	7	2	8.00	1	2			1			1				
EM01-3	25	4	0	0.00												
EM01-4	25	7	5	20.00	2	3			4		1	2				
Total:	105	31	11		5	9	0	0	7	0	1	3	0	0	0	0
Means (based on initial larval count):					10.33	4.67	8.33	0.00	0.00	6.67	0.00	3.00	0.00	0.00	0.00	0.00
Var (S2)					71.56	0.33	1.00	na	na	2.33	na	0.50	na	na	na	na
SEM					4.23	0.33	0.58	na	na	0.88	na	0.50	na	na	na	na
CV (%)					81.86	12.37	12.00	na	na	22.91	na	23.57	na	na	na	na

STAGE 22, 5/31/2000, DAY 36

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	13	6	20.00	2	6			4			1		2		
EM01-2	25	6	2	8.00	2	1			2			1		2		
EM01-3	25	4	2	8.00	2	2			1					2		
EM01-4	25	3	1	4.00	1	1								1		
Total:	105	26	11		7	10	0	0	7	0	0	2	0	7	0	0
Means (based on initial larval count):					10.00	6.67	9.00	0.00	0.00	6.33	0.00	1.83	0.00	6.67	0.00	0.00
Var (S2)					48.00	0.25	5.67	na	na	2.33	na	0.00	na	0.25	na	na
SEM					3.46	0.25	1.19	na	na	0.88	na	0.00	na	0.25	na	na
CV (%)					69.28	7.50	26.45	na	na	24.12	na	0.00	na	7.50	na	na

STAGE 22, 6/13/2000, DAY 49

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	10	4	13.33	2	4			3		1	2				
EM01-2	25	3	1	4.00	1	1						1				
EM01-3	25	4	1	4.00	1	1			1			1				
EM01-4	25	3	1	4.00	1	1			1			1				
Total:	105	20	7		5	7	0	0	5	0	1	5	0	0	0	0
Means (based on initial larval count):					6.33	4.67	6.33	0.00	0.00	4.50	0.00	4.67	0.00	0.00	0.00	0.00
Var (S2)					21.78	0.25	2.25	na	na	1.33	na	0.25	na	na	na	na
SEM					2.33	0.25	0.75	na	na	0.67	na	0.25	na	na	na	na
CV (%)					73.68	10.71	23.68	na	na	25.66	na	10.71	na	na	na	na

STAGE 23, 7/5/2000, DAY 71

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	6	2	6.67	1	2			1		1	2				
EM01-2	25	3	2	8.00		2			2		1	2				
EM01-3	25	4	2	8.00	2	1			2		2	1				
EM01-4	25	3	1	4.00	1	1					1	1				
Total:	105	16	7		4	6	0	0	5	0	5	6	0	0	0	0
Means (based on initial larval count):					6.67	3.83	5.67	0.00	0.00	4.83	0.00	5.67	0.00	0.00	0.00	0.00
Var (S2)					3.56	0.33	0.33	na	na	0.33	na	0.25	0.33	na	na	na
SEM					0.94	0.33	0.29	na	na	0.33	na	0.25	0.29	na	na	na
CV (%)					28.28	15.06	10.19	na	na	11.95	na	10.34	10.19	na	na	na

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000
 STAGE/MALFORMATION DATA
 SITE 34 (W-7a) 18.0 mg/Kg SEDIMENT PCB

STAGE 25-27, 8/8/2000, DAY 105

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	6	2	6.67		1		1				1				
EM01-2	25	3	1	4.00		1		2	1			1				
EM01-3	25	4	2	8.00		2		2	2			1				
EM01-4	25	3	2	8.00		2		2	2			2				
Total:	105	16	7		0	6	0	7	5	0	0	5	0	0	0	0
Means (based on initial larval count):					6.67	0.00	5.83	0.00	6.83	5.00	0.00	0.00	4.83	0.00	0.00	0.00
Var (S2)					3.56	na	0.33	na	0.25	0.33	na	na	0.25	na	na	na
SEM					0.94	na	0.29	na	0.25	0.33	na	na	0.25	na	na	na
CV (%)					28.28	na	9.90	na	7.32	11.55	na	na	10.34	na	na	na

GRAND MEANS OF COMBINED LARVAL MALFORMATION DATA

	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
			EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
Grand Means:		11.80	6.91	8.48	0.20	1.76	6.28	0.00	1.48	2.22	0.00	1.50	0.00	0.00
SEM		2.41	2.05	1.23	0.31	1.33	1.02	0.00	1.10	1.19	0.00	1.10	0.00	0.00

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
SITE 35 (W-6) 42.0 mg/Kg SEDIMENT PCB

STAGE 20, 5/29/2000, DAY 0

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
TP01-1	25	25	6	24.00	3	4		2	2		2			1		
TP01-2	25	25	5	20.00	2	3			2		1			2		
TP01-3	25	25	4	16.00	2	4			3				1	2		
TP01-4	23	23	5	21.74	3	4			2		1		1	2		
Total:	98	98	20		10	15	0	2	9	0	4	0	2	7	0	0
Means:				20.43	10.26	15.35	0.00	2.00	9.17	0.00	4.09	0.00	2.09	7.17	0.00	0.00
Var (S2)				11.42	0.33	0.25	na	na	0.25	na	0.33	na	0.00	0.25	na	na
SEM				1.69	0.29	0.25	na	na	0.25	na	0.33	na	0.00	0.25	na	na
CV (%)				16.54	5.63	3.26	na	na	5.45	na	14.13	na	0.00	6.97	na	na

STAGE 21, 5/19/2000, DAY 10

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
TP01-1	25	25	8	32.00	3	6		2	2		2			1		
TP01-2	25	25	5	20.00	4	3		2	2		1			2		
TP01-3	25	25	5	20.00	3	4		3						2		
TP01-4	23	23	5	21.74	3	4			2		1		1	2		
Total:	98	98	23		13	17	0	7	6	0	4	0	1	7	0	0
Means (based on initial larval count):				23.43	13.26	17.35	0.00	7.00	6.17	0.00	4.09	0.00	1.09	7.17	0.00	0.00
Var (S2)				33.28	0.25	1.58	na	0.33	0.00	na	0.33	na	na	0.25	na	na
SEM				2.88	0.25	0.63	na	0.33	0.00	na	0.33	na	na	0.25	na	na
CV (%)				24.62	3.77	7.25	na	8.25	0.00	na	14.13	na	na	6.97	na	na

STAGE 21, 5/26/2000, DAY 17

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
TP01-1	25	20	7	28.00	5	2			4			2				
TP01-2	25	23	4	16.00	4	4			2			1				
TP01-3	25	20	5	20.00	4	4			3			1				
TP01-4	23	22	5	21.74	3	5			2			1		1		
Total:	98	85	21		16	15	0	0	11	0	0	5	0	1	0	0
Means (based on initial larval count):				21.43	16.26	15.43	0.00	0.00	11.17	0.00	0.00	5.09	0.00	1.09	0.00	0.00
Var (S2)				24.93	0.67	1.58	na	na	0.92	na	na	0.25	na	na	na	na
SEM				2.50	0.41	0.63	na	na	0.48	na	na	0.25	na	na	na	na
CV (%)				23.29	5.02	8.15	na	na	8.57	na	na	9.83	na	na	na	na

STAGE 22, 5/31/2000, DAY 22

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
TP01-1	25	7	2	8.00	2	1			2		2	1				
TP01-2	25	13	3	12.00	3	2			1		3	2				
TP01-3	25	0	na	na												
TP01-4	23	4	2	8.70	2	2			1		2	2			1	
Total:	98	24	7		7	5	0	0	4	0	7	5	0	0	1	0
Means (based on initial larval count):				9.57	9.57	6.90	0.00	0.00	5.45	0.00	9.57	6.90	0.00	0.00	1.45	0.00
Var (S2)				4.57	0.33	0.33	na	na	0.33	na	0.33	0.33	na	na	na	na
SEM				1.23	0.33	0.33	na	na	0.33	na	0.33	0.33	na	na	na	na
CV (%)				22.34	6.04	8.37	na	na	10.59	na	6.04	8.37	na	na	na	na

HOUSATONIC RIVER PROJECT
***RANA pipiens* DEVELOPMENTAL STUDY 2000**
STAGE/MALFORMATION DATA
SITE 35 (W-6) 42.0 mg/Kg SEDIMENT PCB

STAGE 22, 6/13/2000, DAY 35

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
TP01-1	25	6	3	12.00	1	3			1			2				
TP01-2	25	5	2	8.00	2	2			2			1				
TP01-3	25	0	na													
TP01-4	23	4	2	8.70	2	2			2			2				
Total:	98	15	7		5	7	0	0	5	0	0	5	0	0	0	0
Means (based on initial larval count):				9.57	6.90	9.57	0.00	0.00	6.90	0.00	0.00	6.90	0.00	0.00	0.00	0.00
Var (S2)				4.57	0.33	0.33	na	na	0.33	na	na	0.33	na	na	na	na
SEM				1.23	0.33	0.33	na	na	0.33	na	na	0.33	na	na	na	na
CV (%)				22.34	8.37	6.04	na	na	8.37	na	na	8.37	na	na	na	na

STAGE 23, 7/5/2000, DAY 57

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
TP01-1	25	6	1	4.00	1	1			1			1				
TP01-2	25	5	2	8.00	2	1			2			1				
TP01-3	25	0	na													
TP01-4	23	4	2	8.70	2	1			2	1		1				
Total:	98	15	5		5	3	0	0	5	1	0	3	0	0	0	0
Means (based on initial larval count):				6.90	6.90	4.12	0.00	0.00	6.90	1.45	0.00	4.12	0.00	0.00	0.00	0.00
Var (S2)				6.42	0.33	0.00	na	na	0.33	na	na	0.00	na	na	na	na
SEM				1.46	0.33	0.00	na	na	0.33	na	na	0.00	na	na	na	na
CV (%)				36.74	8.37	0.00	na	na	8.37	na	na	0.00	na	na	na	na

STAGE 25-27, 8/8/2000, DAY 91

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
TP01-1	25	2	1	4.00		1			1							
TP01-2	25	5	2	8.00		2			2			1		1		
TP01-3	25	0	na													
TP01-4	23	4	3	13.04		3	1		3			2		3		
Total:	98	11	6		0	6	1	0	6	0	0	3	0	4	0	0
Means (based on initial larval count):				8.35	0.00	8.35	1.45	0.00	8.35	0.00	0.00	4.23	0.00	5.68	0.00	0.00
Var (S2)				20.54	na	1.00	na	na	1.00	na	na	0.50	na	2.00	na	na
SEM				2.62	na	0.58	na	na	0.58	na	na	0.50	na	1.00	na	na
CV (%)				54.29	na	11.98	na	na	11.98	na	na	16.71	na	24.89	na	na

GRAND MEANS OF COMBINED LARVAL MALFORMATION DATA

	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)													
			EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED		
Grand Means:	14.24	9.02	9.02	11.01	0.21	1.29	7.73	0.21	2.53	3.89	0.45	3.02	0.21	0.00		
SEM	3.58	2.60	2.60	2.52	0.27	1.31	0.99	0.27	1.83	1.44	0.41	1.74	0.27	0.00		

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
SITE 36 (W-4) 0.46 mg/Kg SEDIMENT PCB

STAGE 20, 4/19/2000, DAY 0

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	30	2	6.67	2				2				2			
EM01-2	25	25	0	0.00												
EM01-3	25	25	0	0.00												
EM01-4	25	25	2	8.00	1	1										
Total:	105	105	4		3	1	0	0	2	0	0	0	2	0	0	0
Means:				3.67	2.67	1.00	0.00	0.00	1.67	0.00	0.00	0.00	1.67	0.00	0.00	0.00
EM02-1	30	30	0	0.00												
EM02-2	25	25	1	4.00		1										
EM02-3	25	25	0	0.00												
EM02-4	25	25	1	4.00		1										
Total:	105	105	2		0	2	0	0	0	0	0	0	0	0	0	0
Means:				2.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				2.83	1.33	1.50	0.00	0.00	0.83	0.00	0.00	0.00	0.83	0.00	0.00	0.00
Var (S2)				1.39	3.56	0.50	0.00	0.00	1.39	0.00	0.00	0.00	1.39	0.00	0.00	0.00
SEM				0.83	1.33	0.50	0.00	0.00	0.83	0.00	0.00	0.00	0.83	0.00	0.00	0.00
CV (%)				41.59	141.42	47.14	na	na	141.42	na	na	na	141.42	na	na	na

STAGE 21, 4/25/2000, DAY 6

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	29	1	3.33	1					1					1	
EM01-2	25	23	1	4.00	1											
EM01-3	25	24	1	4.00	1	1										
EM01-4	25	25	0	0.00												
Total:	105	101	3		3	1	0	0	1	0	0	0	0	1	0	0
Means (based on initial larval count):				2.83	2.83	1.00	0.00	0.00	0.83	0.00	0.00	0.00	0.00	0.83	0.00	0.00
EM02-1	30	30	0	0.00												
EM02-2	25	25	1	4.00		1										
EM02-3	25	25	0	0.00												
EM02-4	25	25	1	4.00	1									1		
Total:	105	105	2		1	1	0	0	0	0	0	0	0	1	0	0
Means (based on initial larval count):				2.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Grand Means:				2.42	1.92	1.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.92	0.00	0.00
Var (S2)				0.35	1.68	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.01	0.00	0.00
SEM				0.42	0.92	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.08	0.00	0.00
CV (%)				24.38	67.64	0.00	na	na	141.42	na	na	na	na	12.86	na	na

HOUSATONIC RIVER PROJECT
***RANA pipiens* DEVELOPMENTAL STUDY 2000**
STAGE/MALFORMATION DATA
SITE 36 (W-4) 0.46 mg/Kg SEDIMENT PCB

STAGE 22, 5/2/2000, DAY 13

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	19	0	0.00												
EM01-2	25	8	0	0.00												
EM01-3	25	4	0	0.00												
EM01-4	25	19	0	0.00												
Total:	105	50	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	30	30	0	0.00												
EM02-2	25	25	1	4.00		1										
EM02-3	25	25	0	0.00												
EM02-4	25	24	1	4.00	1											
Total:	105	104	2		1	1	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):					2.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:					1.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)					2.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM					0.50	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)					141.42	141.42	141.42	na	na	na	na	na	na	na	na	na

STAGE 23, 5/8/2000, DAY 19

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	16	0	0.00												
EM01-2	25	7	0	0.00												
EM01-3	25	3	0	0.00												
EM01-4	25	13	0	0.00												
Total:	105	39	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	30	0	na	na												
EM02-2	25	25	1	4.00		1										
EM02-3	25	23	0	0.00												
EM02-4	25	21	0	0.00												
Total:	105	69	1		0	1	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):					1.33	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:					0.67	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)					0.89	0.00	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM					0.33	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)					141.42	na	141.42	na	na	na	na	na	na	na	na	na

HOUSATONIC RIVER PROJECT
***RANA pipiens* DEVELOPMENTAL STUDY 2000**
STAGE/MALFORMATION DATA
SITE 36 (W-4) 0.46 mg/Kg SEDIMENT PCB

STAGE 24, 5/19/2000, DAY 30

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	1	0	0.00												
EM01-2	25	6	0	0.00												
EM01-3	25	3	0	0.00												
EM01-4	25	1	0	0.00												
Total:	105	11	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	30	0	na	na												
EM02-2	25	3	0	0.00												
EM02-3	25	6	0	0.00												
EM02-4	25	11	0	0.00												
Total:	105	20	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 24, 5/26/2000, DAY 37

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	1	0	0.00												
EM01-2	25	6	0	0.00												
EM01-3	25	3	0	0.00												
EM01-4	25	1	0	0.00												
Total:	105	11	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	30	0	na	na												
EM02-2	25	2	0	0.00												
EM02-3	25	6	0	0.00												
EM02-4	25	9	0	0.00												
Total:	105	17	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
SITE 36 (W-4) 0.46 mg/Kg SEDIMENT PCB

STAGE 24, 5/31/2000, DAY 42

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	1	0	0.00												
EM01-2	25	6	0	0.00												
EM01-3	25	3	0	0.00												
EM01-4	25	1	0	0.00												
Total:	105	11	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	30	0	na	na												
EM02-2	25	2	0	0.00												
EM02-3	25	6	0	0.00												
EM02-4	25	4	0	0.00												
Total:	105	12	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 26, 6/13/2000, DAY 55

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	1	0	0.00												
EM01-2	25	5	0	0.00												
EM01-3	25	1	0	0.00												
EM01-4	25	1	0	0.00												
Total:	105	8	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	30	0	na	na												
EM02-2	25	2	0	0.00												
EM02-3	25	3	0	0.00												
EM02-4	25	3	0	0.00												
Total:	105	8	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
SITE 36 (W-4) 0.46 mg/Kg SEDIMENT PCB

STAGE 28, 7/5/2000, DAY 77

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	1	0	0.00												
EM01-2	25	5	0	0.00												
EM01-3	25	1	0	0.00												
EM01-4	25	1	0	0.00												
Total:	105	8	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	30	0	na	na												
EM02-2	25	2	0	0.00												
EM02-3	25	3	0	0.00												
EM02-4	25	3	0	0.00												
Total:	105	8	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 36-37 (1>STAGE 38), 8/8/2000, DAY 111

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	1	0	0.00												
EM01-2	25	5	0	0.00												
EM01-3	25	1	0	0.00												
EM01-4	25	0	na	na												
Total:	105	7	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	30	0	na	na												
EM02-2	25	2	0	0.00												
EM02-3	25	3	0	0.00												
EM02-4	25	3	0	0.00												
Total:	105	8	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

GRAND MEANS OF COMBINED LARVAL MALFORMATION DATA

	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)													
			EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED		
Grand Means:	0.69	0.38	0.38	0.37	0.00	0.00	0.13	0.00	0.00	0.00	0.08	0.09	0.00	0.00		
SEM	0.38	0.24	0.24	0.19	0.00	0.00	0.10	0.00	0.00	0.00	0.09	0.10	0.00	0.00		

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
SITE 37 (EW-3) 30.0 mg/Kg SEDIMENT PCB

STAGE 20, 5/9/2000, DAY 0

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
TP01-1	10	10	3	30.00		2			3		1	3				
TP01-2	0	0	na	na												
TP01-3	0	0	na	na												
TP01-4	0	0	na	na												
Total:	10	10	3		0	2	0	0	3	0	1	3	0	0	0	0
Means:				30.00	0.00	20.00	0.00	0.00	30.00	0.00	10.00	30.00	0.00	0.00	0.00	0.00
Var (S2)				na	na	na	na	na	na	na	na	na	na	na	na	na
SEM				na	na	na	na	na	na	na	na	na	na	na	na	na
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 21, 5/19/2000, DAY 10

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
TP01-1	10	9	5	50.00	3	4		2	2		1					
TP01-2	0	0	na	na												
TP01-3	0	0	na	na												
TP01-4	0	0	na	na												
Total:	10	9	5		3	4	0	2	2	0	1	0	0	0	0	0
Means (based on initial larval count):				50.00	30.00	40.00	0.00	20.00	20.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				na	na	na	na	na	na	na	na	na	na	na	na	na
SEM				na	na	na	na	na	na	na	na	na	na	na	na	na
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 21, 5/26/2000, DAY 17

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
TP01-1	10	8	4	40.00	2	4			2		1					
TP01-2	0	0	na	na												
TP01-3	0	0	na	na												
TP01-4	0	0	na	na												
Total:	10	8	4		2	4	0	0	2	0	1	0	0	0	0	0
Means (based on initial larval count):				40.00	20.00	40.00	0.00	0.00	20.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				na	na	na	na	na	na	na	na	na	na	na	na	na
SEM				na	na	na	na	na	na	na	na	na	na	na	na	na
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 22, 5/31/2000, DAY 22

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
TP01-1	10	3	3	30.00	3	2			2		1	2		2	1	
TP01-2	0	0	na	na												
TP01-3	0	0	na	na												
TP01-4	0	0	na	na												
Total:	10	3	3		3	2	0	0	2	0	1	2	0	2	1	0
Means (based on initial larval count):				30.00	30.00	20.00	0.00	0.00	20.00	0.00	10.00	20.00	0.00	20.00	10.00	0.00
Var (S2)				na	na	na	na	na	na	na	na	na	na	na	na	na
SEM				na	na	na	na	na	na	na	na	na	na	na	na	na
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

GRAND MEANS OF COMBINED LARVAL MALFORMATION DATA

	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
			EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
Grand Means:		37.50	20.00	30.00	0.00	5.00	22.50	0.00	10.00	12.50	0.00	5.00	2.50	0.00
SEM		9.57	14.14	11.55	0.00	10.00	5.00	0.00	0.00	15.00	0.00	10.00	5.00	0.00

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
SITE 39 (W-1) 0.15 mg/Kg SEDIMENT PCB

STAGE 21, 4/25/2000, DAY 0

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	30	1	3.33		1										
EM01-2	25	25	1	4.00	1											
EM01-3	25	25	0	0.00												
EM01-4	25	25	0	0.00												
Total:	105	105	2		1	1	0	0	0	0	0	0	0	0	0	0
Means:				1.83	1.00	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				4.56	na	na	na	na	na	na	na	na	na	na	na	na
SEM				1.07	na	na	na	na	na	na	na	na	na	na	na	na
CV (%)				116.42	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 22, 5/2/2000, DAY 7

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	30	1	3.33		1										
EM01-2	25	25	1	4.00	1											
EM01-3	25	25	0	0.00												
EM01-4	25	25	0	0.00												
Total:	105	105	2		1	1	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				1.83	1.00	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				4.56	na	na	na	na	na	na	na	na	na	na	na	na
SEM				1.07	na	na	na	na	na	na	na	na	na	na	na	na
CV (%)				116.42	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 23, 5/19/2000, DAY 24

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	5	0	0.00												
EM01-2	25	0	na	na												
EM01-3	25	1	0	0.00												
EM01-4	25	12	0	0.00												
Total:	105	18	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				na	na	na	na	na	na	na	na	na	na	na	na	na
SEM				na	na	na	na	na	na	na	na	na	na	na	na	na
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 23, 5/26/2000, DAY 31

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	4	2	6.67	1	2					1					
EM01-2	25	0	na													
EM01-3	25	1	0	0.00												
EM01-4	25	12	6	24.00	4	5			3		2			2		
Total:	105	17	8		5	7	0	0	3	0	3	0	0	2	0	0
Means (based on initial larval count):				10.22	6.44	8.89	0.00	0.00	4.00	0.00	3.78	0.00	0.00	2.67	0.00	0.00
Var (S2)				153.48	4.50	4.50	na	na	na	na	0.50	na	na	na	na	na
SEM				7.15	1.50	1.50	na	na	na	na	0.50	na	na	na	na	na
CV (%)				121.19	32.92	23.86	na	na	na	na	18.72	na	na	na	na	na

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
SITE 39 (W-1) 0.15 mg/Kg SEDIMENT PCB

STAGE 24, 5/31/2000, DAY 36

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	4	0	0.00												
EM01-2	25	0	na	na												
EM01-3	25	1	0	0.00												
EM01-4	25	11	1	4.00		1										
Total:	105	16	1		0	1	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):					1.33	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)					5.33	na	na	na	na	na	na	na	na	na	na	na
SEM					1.33	na	na	na	na	na	na	na	na	na	na	na
CV (%)					173.21	na	na	na	na	na	na	na	na	na	na	na

STAGE 25, 6/13/2000, DAY 49

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	4	0	0.00												
EM01-2	25	0	na	na												
EM01-3	25	1	0	0.00												
EM01-4	25	11	0	0.00												
Total:	105	16	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)					na	na	na	na	na	na	na	na	na	na	na	na
SEM					na	na	na	na	na	na	na	na	na	na	na	na
CV (%)					na	na	na	na	na	na	na	na	na	na	na	na

STAGE 27, 7/5/2000, DAY 71

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	4	0	0.00												
EM01-2	25	0	na	na												
EM01-3	25	0	na	na												
EM01-4	25	11	0	0.00												
Total:	105	15	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)					na	na	na	na	na	na	na	na	na	na	na	na
SEM					na	na	na	na	na	na	na	na	na	na	na	na
CV (%)					na	na	na	na	na	na	na	na	na	na	na	na

STAGE 37-40, 8/8/2000, DAY 105

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	30	4	0	0.00												
EM01-2	25	0	na	na												
EM01-3	25	0	na	na												
EM01-4	25	10	0	0.00												
Total:	105	14	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)					na	na	na	na	na	na	na	na	na	na	na	na
SEM					na	na	na	na	na	na	na	na	na	na	na	na
CV (%)					na	na	na	na	na	na	na	na	na	na	na	na

GRAND MEANS OF COMBINED LARVAL MALFORMATION DATA

	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)													
			EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED		
Grand Means:		1.90	1.06	1.49	0.00	0.00	0.50	0.00	0.47	0.00	0.00	0.33	0.00	0.00		
SEM		1.73	1.11	1.52	0.00	0.00	0.71	0.00	0.67	0.00	0.00	0.47	0.00	0.00		

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
R3 EXTERNAL REFERENCE LARVAE IN REFERENCE SITE 40 (MP), 0.04 mg/Kg SEDIMENT PCB

STAGE 20, 5/24/2000, DAY 0

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	20	0	0.00												
EM01-2	20	20	0	0.00												
EM01-3	20	20	0	0.00												
EM01-4	20	20	0	0.00												
Total:	80	80	0		0	0	0	0	0	0	0	0	0	0	0	0
Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	20	20	0	0.00												
EM02-2	20	20	0	0.00												
EM02-3	20	20	0	0.00												
EM02-4	20	20	0	0.00												
Total:	80	80	0		0	0	0	0	0	0	0	0	0	0	0	0
Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 23, 5/31/2000, DAY 7

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	20	0	0.00												
EM01-2	20	18	0	0.00												
EM01-3	20	17	0	0.00												
EM01-4	20	17	0	0.00												
Total:	80	72	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):			Means:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	20	16	0	0.00												
EM02-2	20	18	0	0.00												
EM02-3	20	17	0	0.00												
EM02-4	20	19	0	0.00												
Total:	80	70	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):			Means:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

HOUSATONIC RIVER PROJECT
***RANA pipiens* DEVELOPMENTAL STUDY 2000**
STAGE/MALFORMATION DATA
R3 EXTERNAL REFERENCE LARVAE IN REFERENCE SITE 40 (MP), 0.04 mg/Kg SEDIMENT PCB

STAGE 25, 6/13/2000, DAY 20

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	20	0	0.00												
EM01-2	20	17	0	0.00												
EM01-3	20	17	0	0.00												
EM01-4	20	17	0	0.00												
Total:	80	71	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	20	15	0	0.00												
EM02-2	20	18	0	0.00												
EM02-3	20	17	0	0.00												
EM02-4	20	19	0	0.00												
Total:	80	69	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)					na	na	na	na	na	na	na	na	na	na	na	na

STAGE 29, 7/5/2000, DAY 42

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	20	0	0.00												
EM01-2	20	16	0	0.00												
EM01-3	20	17	0	0.00												
EM01-4	20	16	1	5.00		1										
Total:	80	69	1		0	1	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):					1.25	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	20	15	0	0.00												
EM02-2	20	18	0	0.00												
EM02-3	20	17	1	5.00		1	1									
EM02-4	20	18	0	0.00												
Total:	80	68	1		0	1	1	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):					1.25	0.00	1.25	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:					1.25	0.00	1.25	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)					0.00	0.00	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM					0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)					0.00	na	0.00	141.42	na	na	na	na	na	na	na	na

HOUSATONIC RIVER PROJECT
RANA pipiens DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
R3 EXTERNAL REFERENCE LARVAE IN REFERENCE SITE 40 (MP), 0.04 mg/Kg SEDIMENT PCB

STAGE 30, 7/11/2000, DAY 48

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	20	0	0.00												
EM01-2	20	16	1	5.00		1	1									
EM01-3	20	17	2	10.00		2	2									
EM01-4	20	16	0	0.00												
Total:	80	69	3		0	3	3	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				3.75	0.00	3.75	3.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	20	15	5	25.00		5	4		2			3		1		
EM02-2	20	18	5	25.00		5	5	3	4			5				
EM02-3	20	17	6	30.00		5	4	1	4			5		1		1
EM02-4	20	18	8	40.00		8	7	4	6	1		7		2		
Total:	80	68	24		0	23	20	8	16	1	0	20	0	4	0	1
Means (based on initial larval count):				30.00	0.00	28.75	25.00	10.00	20.00	1.25	0.00	25.00	0.00	5.00	0.00	1.25
Grand Means:				16.88	0.00	16.25	14.38	5.00	10.00	0.63	0.00	12.50	0.00	2.50	0.00	0.63
Var (S2)				344.53	0.00	312.50	225.78	50.00	200.00	0.78	0.00	312.50	0.00	12.50	0.00	0.78
SEM				13.13	0.00	12.50	10.63	5.00	10.00	0.63	0.00	12.50	0.00	2.50	0.00	0.63
CV (%)				109.99	na	108.79	104.53	141.42	141.42	141.42	na	141.42	na	141.42	na	141.42

STAGE 38, 8/8/2000, DAY 76

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	13	1	5.00		1										
EM01-2	20	15	1	5.00		1										
EM01-3	20	15	1	5.00		1			1							
EM01-4	20	16	1	5.00		1	1		1							
Total:	80	59	4		0	4	1	0	2	0	0	0	0	0	0	0
Means (based on initial larval count):				5.00	0.00	5.00	1.25	0.00	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	20	15	0	0.00												
EM02-2	20	18	0	0.00												
EM02-3	20	16	0	0.00												
EM02-4	20	17	0	0.00												
Total:	80	66	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				2.50	0.00	2.50	0.63	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				12.50	0.00	12.50	0.78	0.00	3.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				2.50	0.00	2.50	0.63	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				141.42	na	141.42	141.42	na	141.42	na	na	na	na	na	na	na

GRAND MEANS OF COMBINED LARVAL MALFORMATION DATA

	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
			EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
Grand Means:	3.44	0.00	0.00	3.33	2.60	0.83	1.88	0.10	0.00	2.08	0.00	0.42	0.00	0.10
SEM	2.35	0.00	2.26	2.04	2.04	0.72	1.42	0.09	0.00	1.80	0.00	0.36	0.00	0.09

HOUSATONIC RIVER PROJECT
***RANA pipiens* DEVELOPMENTAL STUDY 2000**
GROWTH DATA SUMMARY

SITE 34

SITE W-7a (18.0 mg/Kg Sed PCB) Reps=4, 105 Days*			
STUDY DAY	DEVELOPMENTAL STAGE	MEAN GROWTH (cm)	SEM
0	20	1.323	0.022
7	20	1.504	0.019
13	20	1.504	0.030
24	21	1.793	0.043
31	21	1.918	0.080
36	22	2.017	0.053
49	22	2.575	0.072
71	23	3.824	0.162
105	27	4.475	0.145

SITE 35

SITE W-6 (42.0 mg/Kg Sed PCB) Reps=4, 91 Days*			
STUDY DAY	DEVELOPMENTAL STAGE	MEAN GROWTH (cm)	SEM
0	20	1.268	0.020
10	21	1.664	0.058
17	21	1.628	0.027
22	22	1.881	0.046
35	22	2.573	0.112
57	23	4.366	0.107
91	27	4.482	0.099

SITE 36

SITE W-4 (0.46 mg/Kg Sed PCB) Reps=8, 111 Days*			
STUDY DAY	DEVELOPMENTAL STAGE	MEAN GROWTH (cm)	SEM
0	20	0.933	0.056
6	21	1.174	0.018
13	22	1.350	0.067
19	23	1.450	0.071
30	24	2.161	0.266
37	24	2.301	0.357
42	24	2.536	0.404
55	26	3.316	0.453
77	28	4.786	0.798
111	37	4.510	0.036

HOUSATONIC RIVER PROJECT
***RANA pipiens* DEVELOPMENTAL STUDY 2000**
GROWTH DATA SUMMARY

SITE 37

SITE EW-3 (30.0 mg/Kg Sed PCB) Reps=1, 22 Days*			
STUDY DAY	DEVELOPMENTAL STAGE	MEAN GROWTH (cm)	SEM
0	20	1.469	0.054
10	21	1.877	0.072
17	21	1.956	0.072
22	22	2.033	0.107

SITE 39

SITE W-1 (0.15 mg/Kg Sed PCB) Reps=4, 105 Days*			
STUDY DAY	DEVELOPMENTAL STAGE	MEAN GROWTH (cm)	SEM
0	21	0.903	0.015
7	22	1.372	0.022
13	22	1.334	0.004
24	23	2.138	0.194
31	23	2.491	0.655
36	24	2.546	0.716
49	25	3.186	0.767
71	27	3.387	0.304
105	40	3.880	0.246

REFERENCE SITE DATA SHARED WITH CROSSOVER STUDY
R3 LARVAE IN SITE 40 WATER/SEDIMENT

R3 Ref Larvae in Site MP (0.04 mg/kg Sed PCB) Reps=8, 76 Days*			
STUDY DAY	DEVELOPMENTAL STAGE	MEAN GROWTH (cm)	SEM
0	20	1.018	0.010
7	23	1.488	0.022
20	25	2.311	0.073
42	29	3.579	0.028
48	30	3.803	0.029
76	38	4.383	0.048

*Test Duration.

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 34 (W-7a) (18.0 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	1.318	1.424	1.382	1.318
DATE	1.377	1.366	1.416	1.345
04/25/00	1.420	1.389	1.295	1.370
	1.144	1.359	1.360	1.287
STUDY DAY	1.290	1.359	1.290	1.318
0	1.137	1.482	1.340	1.339
	1.306	1.399	1.304	1.304
STAGE	1.208	1.268	1.421	1.351
20	1.352	1.364	1.345	1.231
	1.208	1.403	1.339	1.277
	1.280	1.364	1.378	1.211
	1.415	1.379	1.300	1.178
	1.339	1.453	1.390	1.253
	1.228	1.400	1.331	1.253
	1.304	1.377	1.221	1.159
	1.204	1.343	1.339	1.377
	1.422	1.318	1.455	1.204
	1.382	1.447	1.352	1.276
	1.177	1.137	1.278	1.156
	1.246	1.327	1.275	1.154
	1.247	1.281	1.314	1.238
	1.263	1.352	1.205	1.395
	1.213	1.402	1.352	1.389
	1.224	1.550	1.272	1.302
	1.277	1.554	1.366	1.302
	1.209			
	1.406			
	1.302			
	1.566			
	1.586			
<hr/>				
Individual Statistics				
N	30	25	25	25
Mean	1.302	1.380	1.333	1.279
Var. (S ²)	0.012	0.007	0.004	0.006
SEM	0.020	0.017	0.012	0.015
Site Average				
Total N	105			
Site Mean	1.323			
Var. (S ²)	0.002			
SEM	0.022			

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 34 (W-7a) (18.0 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	1.546	1.555	1.384	1.617
DATE	1.294	1.464	1.457	1.348
05/02/00	1.429	1.666	1.444	1.608
	1.491	1.682	1.551	1.608
STUDY DAY	1.353	1.461	1.582	1.617
7	1.316	1.602	1.480	1.544
	1.408	1.517	1.560	1.649
STAGE	1.455	1.461	1.551	1.699
20	1.429	1.576	1.467	1.602
	1.151	1.570	1.570	1.519
	1.543	1.429	1.587	1.591
	1.453	1.565	1.618	1.567
	1.506	1.461	1.564	1.586
	1.380	1.576	1.558	1.438
	1.528	1.285	1.515	1.351
	1.605	1.327	1.468	1.353
	1.543	1.540	1.646	1.434
	1.488	1.402	1.587	1.506
	1.655	1.280	1.617	1.498
	1.505	1.258	1.486	1.614
	1.543	1.182	1.428	1.510
	1.563	1.484	1.549	1.568
	1.569	1.556	1.451	1.517
	1.502	1.608	1.464	1.564
	1.523	1.330	1.663	1.719
	1.569			
	1.503			
	1.470			
	1.482			
	1.402			
<hr/>				
Individual Statistics				
N	30	25	25	25
Mean	1.474	1.473	1.530	1.545
Var. (S ²)	0.010	0.018	0.005	0.010
SEM	0.019	0.027	0.015	0.020
Site Average				
Total N	105			
Site Mean	1.506			
Var. (S ²)	0.001			
SEM	0.019			

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 34 (W-7a) (18.0 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	1.494	1.314	1.607	1.680
DATE	1.628	1.421	1.433	1.353
05/08/00	1.623	1.296	1.440	1.521
	1.530	1.274	1.556	1.717
STUDY DAY	1.610	1.399	1.605	1.583
13	1.498	1.535	1.510	1.437
	1.320	1.535	1.364	1.460
STAGE	1.299	1.577	1.728	1.553
20	1.499	1.275	1.643	1.609
	1.437	1.595	1.456	1.737
	1.545	1.605	1.425	1.650
	1.393	1.613	1.408	1.595
	1.419	1.510	1.352	1.511
	1.500	1.463	1.478	1.595
	1.707	1.589	1.340	1.579
	1.616	1.566	1.455	1.625
	1.463	1.478	1.408	1.660
	1.557	1.463	1.662	1.581
	1.461	1.310	1.526	1.563
	1.411	1.732	1.605	1.522
	1.182	1.430	1.509	1.788
	1.286	1.436	1.648	1.649
	1.343	1.510	1.649	1.580
	1.373	1.501	1.521	1.476
	1.437			
	1.432			
	1.333			
	1.030			
	1.443			
	1.421			
<hr/>				
Individual Statistics				
N	30	24	24	24
Mean	1.443	1.476	1.514	1.584
Var. (S ²)	0.020	0.015	0.012	0.010
SEM	0.026	0.025	0.022	0.020
Site Average				
Total N	102			
Site Mean	1.504			
Var. (S ²)	0.004			
SEM	0.030			

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 34 (W-7a) (18.0 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	1.935	1.710	1.856	1.593
DATE	1.703	2.001	1.555	1.367
05/19/00	1.972	1.955	1.726	1.551
	2.233	1.962	1.915	1.518
STUDY DAY	1.726	1.769	1.915	1.762
24	1.635	1.915	1.670	1.535
	1.868	1.815	1.951	1.563
STAGE	1.588		1.699	1.811
21	1.507		2.039	1.978
	1.785		1.746	1.684
	1.611		1.770	1.742
	2.036		1.880	1.918
	1.720		1.885	1.633
	1.989			1.779

Individual Statistics

N	14	7	13	14
Mean	1.808	1.875	1.816	1.674
Var. (S ²)	0.042	0.012	0.018	0.028
SEM	0.055	0.042	0.037	0.045

Site Average

Total N	48
Site Mean	1.793
Var. (S ²)	0.007
SEM	0.043

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 34 (W-7a) (18.0 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	2.246	1.983	1.804	1.780
DATE	1.587	2.220	1.998	1.830
05/26/00	2.562	2.118	2.201	1.588
	1.793	1.963	1.947	1.765
STUDY DAY	1.962	2.112		1.880
31	1.773	1.872		1.648
	1.976	2.314		1.462
STAGE	2.161			
21	2.184			
	2.279			
	2.113			
	1.899			
	0.098			

Individual Statistics

N	13	7	4	7
Mean	1.895	2.083	1.988	1.708
Var. (S ²)	0.357	0.024	0.027	0.022
SEM	0.166	0.058	0.082	0.056

Site Average

Total N	31
Site Mean	1.918
Var. (S ²)	0.026
SEM	0.080

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 34 (W-7a) (18.0 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	1.984	2.113	2.056	1.861
DATE	1.949	1.828	2.317	2.029
05/31/00	1.987	1.811	2.121	1.965
	1.897	1.915	2.132	
STUDY DAY	2.115	1.815		
36	2.660	2.052		
	2.138			
STAGE	2.346			
22	1.710			
	2.154			
	1.680			
	1.738			
	2.143			

Individual Statistics

N	13	6	4	3
Mean	2.038	1.922	2.157	1.952
Var. (S ²)	0.073	0.017	0.013	0.007
SEM	0.075	0.054	0.056	0.049

Site Average

Total N	26
Site Mean	2.017
Var. (S ²)	0.011
SEM	0.053

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 34 (W-7a) (18.0 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	3.483	2.569	2.366	3.309
DATE	1.946	2.505	2.796	2.486
06/13/00	2.385	2.822	3.046	2.030
	2.190		2.566	
STUDY DAY	2.108			
49	2.141			
	2.032			
STAGE	2.732			
22	2.497			
	2.153			

Individual Statistics

N	10	3	4	3
Mean	2.367	2.632	2.694	2.608
Var. (S ²)	0.209	0.028	0.086	0.420
SEM	0.145	0.097	0.147	0.374

Site Average

Total N	20
Site Mean	2.575
Var. (S ²)	0.021
SEM	0.072

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 34 (W-7a) (18.0 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	3.329	4.516	3.951	3.440
DATE	2.884	3.997	2.641	4.566
07/05/00	3.960	3.937	3.468	3.518
	5.535		3.450	
STUDY DAY	4.289			
71	3.559			
STAGE				
23				

Individual Statistics

N	6	3	4	3
Mean	3.926	4.150	3.378	3.841
Var. (S^2)	0.860	0.101	0.295	0.395
SEM	0.379	0.184	0.272	0.363

Site Average

Total N	16
Site Mean	3.824
Var. (S^2)	0.105
SEM	0.162

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 34 (W-7a) (18.0 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	3.364	4.875	5.001	4.431
DATE	5.508	5.046	3.230	5.323
08/08/00	4.851	4.626	5.024	3.769
	3.293		4.298	
STUDY DAY	4.173			
105	3.738			
STAGE				
27				

Individual Statistics

N	6	3	4	3
Mean	4.155	4.849	4.388	4.508
Var. (S ²)	0.772	0.045	0.710	0.608
SEM	0.359	0.122	0.421	0.450

Site Average

Total N	16
Site Mean	4.475
Var. (S ²)	0.084
SEM	0.145

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 35 (W-6) (42.0 mg/kg Sediment PCB Concentration)

	TP01-1	TP01-2	TP01-3	TP01-4
	1.165	1.233	1.339	1.378
DATE	1.157	1.288	1.253	1.395
05/09/00	1.088	1.303	1.203	1.272
	1.316	1.157	1.255	1.265
STUDY DAY	1.200	1.132	1.203	1.262
0	1.382	1.236	1.227	1.245
	1.176	1.260	1.254	1.329
STAGE	1.321	1.321	1.347	1.284
20	1.151	1.236	1.268	1.264
	1.130	1.178	1.205	1.228
	1.236	1.299	1.372	1.337
	1.284	1.357	1.286	1.295
	1.178	1.176	1.272	1.269
	1.220	1.097	1.488	1.313
	1.262	1.228	1.481	1.236
	1.330	1.215	1.414	1.249
	1.150	1.406	1.410	1.283
	1.134	1.291	1.089	1.329
	1.183	1.205	1.357	1.257
	1.331	1.283	1.157	1.215
	1.200	1.150	1.428	1.365
	1.317	1.193	1.289	1.434
	1.337	1.185	1.353	1.499
	1.258	1.339	1.313	
	1.280	1.150	1.259	

Individual Statistics

N	25	25	25	23
Mean	1.231	1.237	1.301	1.305
Var. (S ²)	0.007	0.006	0.010	0.005
SEM	0.016	0.015	0.020	0.015

Site Average

Total N	98
Site Mean	1.268
Var. (S ²)	0.002
SEM	0.020

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 35 (W-6) (42.0 mg/kg Sediment PCB Concentration)

	TP01-1	TP01-2	TP01-3	TP01-4
	1.977	1.593	1.797	1.635
DATE	1.631	1.382	1.450	1.422
05/19/00	1.482	1.607	1.691	1.684
	1.681	1.588	1.782	1.759
STUDY DAY	1.533	1.717	1.749	1.696
10	1.488	1.599	1.455	1.998
	1.422	1.599	1.841	1.824
STAGE	1.618	1.932	1.644	1.901
21	1.723	1.944	1.847	1.644
	1.400	1.863	1.877	1.868
	1.409	1.718	1.847	1.829
	1.481	1.707	1.699	1.664
	1.532	1.844	1.817	1.664
	1.357	1.535	1.909	1.610
	1.473	1.906	1.844	1.560
	1.374	1.588	1.651	1.627
	1.464	1.582	1.709	1.604
	1.473	1.427	1.913	1.726
	1.294	1.696	1.887	1.696
	1.651	1.996	1.588	1.770
	1.401	1.564	1.814	1.980
	1.202	1.814	1.835	1.697
	1.425	1.676	1.507	1.769
	1.452	1.604	1.782	
	1.427	1.774	1.789	
<hr/>				
Individual Statistics				
N	25	25	25	23
Mean	1.495	1.690	1.749	1.723
Var. (S ²)	0.024	0.026	0.018	0.018
SEM	0.031	0.032	0.027	0.028
Site Average				
Total N	98			
Site Mean	1.664			
Var. (S ²)	0.013			
SEM	0.058			

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 35 (W-6) (42.0 mg/kg Sediment PCB Concentration)

	TP01-1	TP01-2	TP01-3	TP01-4
	1.483	1.448	1.848	1.538
DATE	1.627	1.783	1.581	1.634
05/26/00	1.496	1.913	2.017	1.852
	1.797	1.550	1.829	1.808
STUDY DAY	1.766	1.621	1.597	1.624
17	1.574	1.657	1.562	1.658
	1.740	1.730	1.527	1.792
STAGE	1.648	1.462	1.531	1.656
21	1.499	1.760	1.468	1.670
	1.333	1.670	1.514	1.531
	1.463	1.485	1.652	1.745
	1.703	1.703	1.564	1.760
	1.481	1.716	1.618	1.517
	1.367	1.786	1.390	1.521
	1.414	1.836	1.439	1.673
	1.594	1.696	1.452	1.685
	1.521	1.675	1.570	1.518
	1.516	1.581	1.582	1.766
	1.628	1.690	1.741	1.651
	1.680	1.608	1.531	1.668
		1.903		1.712
		1.735		1.769
		1.495		
<hr/>				
Individual Statistics				
N	20	23	20	22
Mean	1.567	1.674	1.601	1.670
Var. (S ²)	0.017	0.017	0.024	0.010
SEM	0.029	0.027	0.034	0.021
Site Average				
Total N	85			
Site Mean	1.628			
Var. (S ²)	0.003			
SEM	0.027			

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 35 (W-6) (42.0 mg/kg Sediment PCB Concentration)

	TP01-1	TP01-2	TP01-3	TP01-4
	1.707	1.869		1.995
DATE	1.813	1.697		1.646
05/31/00	1.697	1.905		2.002
	1.854	1.757		2.248
STUDY DAY	1.966	1.650		
22	1.982	1.654		
	1.850	2.050		
STAGE		1.696		
22		1.766		
		1.815		
		1.917		
		1.999		
		2.043		

Individual Statistics

N	7	13	0	4
Mean	1.839	1.832	na	1.973
Var. (S ²)	0.013	0.020	na	0.061
SEM	0.042	0.040	na	0.124

Site Average

Total N	24
Site Mean	1.881
Var. (S ²)	0.006
SEM	0.046

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 35 (W-6) (42.0 mg/kg Sediment PCB Concentration)

	TP01-1	TP01-2	TP01-3	TP01-4
	2.235	2.273		2.508
DATE	2.271	2.543		2.686
06/13/00	2.457	2.061		2.914
	2.773	2.248		2.936
STUDY DAY	2.607	2.737		
35	3.168			
STAGE				
22				

Individual Statistics

N	6	5	0	4
Mean	2.585	2.372	na	2.761
Var. (S ²)	0.123	0.071	na	0.041
SEM	0.143	0.119	na	0.101

Site Average

Total N	15
Site Mean	2.573
Var. (S ²)	0.038
SEM	0.112

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 35 (W-6) (42.0 mg/kg Sediment PCB Concentration)

	TP01-1	TP01-2	TP01-3	TP01-4
	5.346	3.604		3.834
DATE	3.769	5.565		3.778
07/05/00	4.546	4.473		5.116
	5.088	4.037		4.389
STUDY DAY	4.125	3.520		
57	4.594			
STAGE				
23				

Individual Statistics

N	6	5	0	4
Mean	4.578	4.240	na	4.279
Var. (S ²)	0.342	0.694	na	0.387
SEM	0.239	0.372	na	0.311

Site Average

Total N	15
Site Mean	4.366
Var. (S ²)	0.034
SEM	0.107

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 35 (W-6) (42.0 mg/kg Sediment PCB Concentration)

	TP01-1	TP01-2	TP01-3	TP01-4
	5.046	3.464		4.674
DATE	3.566	4.000		4.249
08/08/00		4.830		3.648
		4.880		6.022
STUDY DAY		5.276		
91				
STAGE				
27				

Individual Statistics

N	2	5	0	4
Mean	4.306	4.490	na	4.649
Var. (S ²)	1.095	0.545	na	1.016
SEM	0.740	0.330	na	0.504

Site Average

Total N	11
Site Mean	4.482
Var. (S ²)	0.029
SEM	0.099

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 36 (W-4) (0.46 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	1.023	1.144	0.990	1.005	0.881	0.970	0.819	0.794
DATE	0.977	1.018	1.085	1.020	0.871	0.894	0.863	0.834
04/19/00	1.067	1.026	1.017	1.085	0.942	0.922	0.889	0.894
	0.919	0.949	1.062	0.916	0.844	0.932	0.936	0.930
STUDY DAY	1.012	0.877	1.082	1.067	0.849	0.908	0.894	0.774
0	1.056	0.877	1.040	0.999	0.977	0.784	0.938	0.806
	1.036	0.894	1.000	1.026	0.854	0.849	0.860	0.898
STAGE	0.857	1.000	1.010	1.116	0.962	0.762	0.771	0.938
20	1.044	0.889	1.137	1.017	0.832	0.720	0.884	0.943
	0.881	0.983	0.871	1.071	0.808	0.808	0.809	1.113
	0.903	0.819	1.018	0.974	0.886	0.871	0.860	0.926
	1.027	1.010	1.115	1.017	0.845	0.943	0.927	0.938
	0.891	0.809	1.023	0.963	0.754	0.949	1.017	0.932
	0.985	1.055	1.036	1.008	0.918	0.891	0.671	0.877
	1.041	0.977	0.856	1.008	0.919	0.888	0.782	0.834
	1.005	1.005	0.945	0.994	0.806	0.977	0.867	0.881
	1.036	0.966	0.877	1.072	1.109	0.965	0.926	0.915
	0.922	0.956	0.948	1.126	0.961	0.784	0.876	0.877
	0.942	0.881	1.044	1.030	0.885	0.889	0.834	0.889
	0.845	0.908	1.083	1.063	0.871	0.862	1.010	0.784
	0.943	1.097	1.060	1.056	0.816	0.999	0.969	0.611
	0.838	1.012	0.975	1.067	0.795	0.903	0.816	0.849
	1.056	1.029	1.056	0.903	0.955	0.915	0.844	0.794
	1.066	1.057	0.992	0.926	0.851	0.785	0.779	0.877
	0.894	0.767	0.993	1.038	0.912	0.891	0.808	0.969
	0.971				0.871			
	0.999				0.966			
	0.870				0.771			
	0.870				0.816			
	0.919				0.983			
<hr/>								
Individual Statistics								
N	30	25	25	25	30	25	25	25
Mean	0.963	0.960	1.013	1.023	0.884	0.882	0.866	0.875
Var. (S ²)	0.006	0.009	0.005	0.003	0.006	0.005	0.006	0.008
SEM	0.014	0.018	0.014	0.011	0.014	0.015	0.016	0.018
EM01 Average					EM02 Average			
Total N	105				Total N	105		
Site Mean	0.990				Site Mean	0.877		
Var. (S ²)	0.001				Var. (S ²)	0.000		
SEM	0.016				SEM	0.004		
Site Average								
Total N	210							
Site Mean	0.933							
Var. (S ²)	0.006							
SEM	0.056							

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 36 (W-4) (0.46 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	1.129	1.258	1.088	1.083	1.170	1.198	1.044	1.217
DATE	1.222	1.191	1.223	1.059	1.140	1.334	1.118	1.116
04/25/00	1.191	1.154	0.922	1.199	0.965	1.279	1.154	1.097
	1.248	1.143	0.971	1.177	1.154	1.318	1.082	1.295
STUDY DAY	1.242	1.181	1.036	1.133	1.045	1.285	1.232	1.289
6	1.228	1.166	1.226	1.295	0.969	1.204	1.308	1.123
	1.203	1.263	1.243	1.183	1.140	1.158	1.315	1.126
STAGE	1.236	1.036	1.194	1.294	1.166	1.186	1.201	1.272
21	1.246	1.154	1.146	1.200	1.154	1.213	1.346	1.273
	1.170	1.181	1.166	1.327	1.185	1.305	0.984	1.285
	1.094	1.304	1.276	1.315	1.132	1.265	1.167	1.023
	1.204	1.232	1.240	1.243	1.023	1.220	1.211	1.129
	1.223	1.279	1.170	1.277	1.088	1.211	1.027	1.070
	1.118	1.218	1.120	1.213	1.113	1.164	1.156	1.137
	1.228	1.180	1.149	1.316	0.961	1.115	1.204	1.093
	1.159	1.093	1.204	1.352	1.246	1.180	1.129	1.090
	1.044	1.151	1.327	1.187	1.057	1.094	1.144	0.984
	1.137	1.378	1.223	1.279	1.116	1.057	1.154	1.137
	1.063	1.140	1.236	1.140	1.178	1.211	1.094	1.248
	1.114	1.185	1.017	1.232	1.204	1.088	0.969	0.969
	1.101	1.223	1.239	1.183	0.936	1.148	1.165	1.193
	1.222	1.295	1.137	1.304	1.132	1.010	1.256	1.254
	1.158	1.319	1.246	1.336	1.221	1.056	1.154	1.231
	1.265		1.177	1.201	1.157	1.141	1.085	1.170
	1.052			1.113	1.085	1.315	1.194	1.133
	1.211				1.137			
	1.181				1.137			
	1.161				1.273			
	1.151				1.200			
					1.183			
<hr/>								
Individual Statistics								
N	29	23	24	25	30	25	25	25
Mean	1.172	1.205	1.166	1.226	1.122	1.190	1.156	1.158
Var. (S ²)	0.004	0.006	0.010	0.007	0.007	0.008	0.009	0.009
SEM	0.012	0.016	0.020	0.016	0.016	0.018	0.019	0.019
EM01 Average				EM02 Average				
Total N	101			Total N	105			
Site Mean	1.192			Site Mean	1.157			
Var. (S ²)	0.001			Var. (S ²)	0.001			
SEM	0.014			SEM	0.014			
Site Average								
Total N	206							
Site Mean	1.174							
Var. (S ²)	0.001							
SEM	0.018							

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 36 (W-4) (0.46 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	1.423	1.201	1.509	1.401	1.353	1.327	1.174	1.366
DATE	1.201	1.555	1.250	1.232	1.314	1.151	1.159	1.327
05/02/00	1.191	1.692	1.662	1.340	1.100	1.174	1.215	1.482
	1.238	1.495	1.246	1.532	1.286	1.091	1.271	1.517
STUDY DAY	1.314	1.515		1.267	1.052	1.136	1.181	1.248
13	1.257	1.518		1.255	1.220	1.186	1.227	1.457
	1.443	1.592		1.411	1.239	1.159	1.246	1.494
STAGE	1.521	1.676		1.305	1.347	1.401	1.415	1.186
22	1.347			1.353	1.428	1.244	1.353	1.316
	1.338			1.519	1.193	1.078	1.262	1.248
	1.480			1.461	1.085	1.281	1.433	1.132
	1.213			1.392	1.418	1.190	1.170	1.186
	1.312			1.414	1.211	1.281	1.122	1.270
	1.106			1.449	1.250	1.278	1.163	1.288
	1.348			1.522	1.219	1.302	1.216	1.234
	1.401			1.407	1.343	1.327	1.296	1.170
	1.548			1.215	1.106	1.453	1.281	1.359
	1.332			1.540	1.278	1.458	1.301	1.336
	1.322			1.361	1.253	1.254	1.352	1.246
					1.184	1.551	1.363	1.387
					1.144	1.334	1.331	1.412
					1.347	1.458	1.397	1.363
					1.146	1.333	1.369	1.254
					1.381	1.302	1.392	1.281
					1.227	1.354	1.316	
					1.230			
					1.133			
					1.359			
					1.268			
					1.453			
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Individual Statistics								
N	19	8	4	19	30	25	25	24
Mean	1.333	1.530	1.417	1.388	1.252	1.284	1.280	1.315
Var. (S ²)	0.014	0.023	0.042	0.010	0.011	0.015	0.008	0.011
SEM	0.027	0.054	0.102	0.023	0.020	0.024	0.018	0.022
EM01 Average				EM02 Average				
Total N	50			Total N	104			
Site Mean	1.417			Site Mean	1.283			
Var. (S ²)	0.007			Var. (S ²)	0.001			
SEM	0.042			SEM	0.013			
Site Average								
Total N	154							
Site Mean	1.350							
Var. (S ²)	0.009							
SEM	0.067							

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
SITE 36 (W-4) (0.46 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	1.481	1.559	1.456	1.554		1.450	1.448	1.560
DATE	1.379	1.505	1.737	1.468		1.399	1.370	1.540
05/08/00	1.276	1.676	1.875	1.423		1.546	1.352	1.166
	1.436	1.653		1.480		1.275	1.599	1.342
STUDY DAY	1.353	1.554		1.545		1.408	1.556	1.478
19	1.269	1.537		1.468		1.439	1.331	1.414
	1.256	1.609		1.504		1.368	1.381	1.439
STAGE	1.320			1.445		1.352	1.365	1.426
23	1.195			1.447		1.291	1.384	1.614
	1.351			1.602		1.320	1.351	1.137
	1.245			1.607		1.521	1.501	1.287
	1.252			1.389		1.275	1.481	1.305
	1.481			1.455		1.107	1.258	1.486
	1.302					1.329	1.297	1.381
	1.186					1.379	1.270	1.373
	1.355					1.320	1.336	1.217
						1.329	1.502	1.329
						1.326	1.443	1.393
						1.456	1.329	1.467
						1.324	1.400	1.340
						1.297	1.283	1.381
						1.378	1.430	
						1.390	1.285	
						1.398		
						1.399		
<hr/>								
Individual Statistics								
N	16	7	3	13	0	25	23	21
Mean	1.321	1.585	1.689	1.491	na	1.363	1.389	1.385
Var. (S ²)	0.008	0.004	0.046	0.005	na	0.008	0.009	0.015
SEM	0.023	0.024	0.123	0.019	na	0.018	0.019	0.027
EM01 Average				EM02 Average				
Total N	39			Total N	69			
Site Mean	1.522			Site Mean	1.379			
Var. (S ²)	0.024			Var. (S ²)	0.000			
SEM	0.078			SEM	0.008			
Site Average								
Total N	108							
Site Mean	1.450							
Var. (S ²)	0.010							
SEM	0.071							

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
SITE 36 (W-4) (0.46 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	2.112	2.400	2.896	2.536		1.625	2.121	1.782
DATE		1.829	3.098			1.754	2.189	1.581
05/19/00		1.888	2.386			2.049	1.880	1.749
		2.134					1.996	2.179
STUDY DAY		2.514					2.211	2.056
30		2.828					2.064	1.651
								1.091
STAGE								1.542
24								1.889
								1.980
								2.279

Individual Statistics

N	1	6	3	1	0	3	6	11
Mean	2.112	2.266	2.793	2.536	na	1.809	2.077	1.798
Var. (S ²)	na	0.149	0.135	na	na	0.047	0.016	0.112
SEM	na	0.158	0.212	na	na	0.126	0.051	0.101

EM01 Average

Total N	11
Site Mean	2.427
Var. (S ²)	0.090
SEM	0.150

EM02 Average

Total N	20
Site Mean	1.895
Var. (S ²)	0.025
SEM	0.091

Site Average

Total N	31
Site Mean	2.161
Var. (S ²)	0.142
SEM	0.266

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 36 (W-4) (0.46 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	2.391	2.668	2.994	3.282		2.193	1.845	1.597
DATE		1.745	3.304			2.107	1.789	1.712
05/26/00		1.638	2.369				1.815	1.516
		2.093					2.300	1.775
STUDY DAY		2.011					2.453	1.272
37		2.276					2.066	1.636
								1.798
STAGE								1.391
24								2.052

Individual Statistics

N	1	6	3	1	0	2	6	9
Mean	2.391	2.072	2.889	3.282	na	2.150	2.045	1.639
Var. (S ²)	na	0.139	0.227	na	na	0.004	0.078	0.054
SEM	na	0.152	0.275	na	na	0.043	0.114	0.078

EM01 Average

Total N	11
Site Mean	2.659
Var. (S ²)	0.286
SEM	0.267

EM02 Average

Total N	17
Site Mean	1.944
Var. (S ²)	0.073
SEM	0.156

Site Average

Total N	28
Site Mean	2.301
Var. (S ²)	0.255
SEM	0.357

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 36 (W-4) (0.46 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	2.857	2.618	3.099	3.826		2.059	2.261	1.531
DATE		2.173	3.125			2.636	2.734	1.842
05/31/00		2.290	2.448				1.904	2.316
		2.263					1.861	2.104
STUDY DAY		1.815					2.027	
42		1.940					1.811	
STAGE								
24								

Individual Statistics

N	1	6	3	1	0	2	6	4
Mean	2.857	2.183	2.891	3.826	na	2.347	2.100	1.948
Var. (S ²)	na	0.080	0.147	na	na	0.166	0.123	0.115
SEM	na	0.116	0.221	na	na	0.288	0.143	0.169

EM01 Average

Total N	11
Site Mean	2.939
Var. (S ²)	0.456
SEM	0.338

EM02 Average

Total N	12
Site Mean	2.132
Var. (S ²)	0.041
SEM	0.116

Site Average

Total N	23
Site Mean	2.536
Var. (S ²)	0.326
SEM	0.404

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
SITE 36 (W-4) (0.46 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	3.565	2.446	3.817	5.200		3.330	2.966	2.802
DATE		2.399				2.697	3.207	2.432
06/13/00		1.989					2.660	2.667
		3.025						
STUDY DAY		2.608						
55								
STAGE								
26								
<hr/>								
Individual Statistics								
N	1	5	1	1	0	2	3	3
Mean	3.565	2.493	3.817	5.200	na	3.014	2.944	2.634
Var. (S ²)	na	0.140	na	na	na	0.200	0.075	0.035
SEM	na	0.168	na	na	na	0.317	0.158	0.108
EM01 Average					EM02 Average			
Total N	8				Total N	8		
Site Mean	3.769				Site Mean	2.864		
Var. (S ²)	1.239				Var. (S ²)	0.041		
SEM	0.557				SEM	0.117		
Site Average								
Total N	16							
Site Mean	3.316							
Var. (S ²)	0.410							
SEM	0.453							

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000
 GROWTH DATA (Length in cm)
 SITE 36 (W-4) (0.46 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
DATE	4.488	4.695	6.130	7.484		3.283	4.131	3.816
07/05/00		3.780				5.632	3.411	3.951
		4.671					3.838	3.371
		5.176						
STUDY DAY		2.836						
77								
STAGE								
28								

Individual Statistics

N	1	5	1	1	0	2	3	3
Mean	4.488	4.232	6.130	7.484	na	4.457	3.793	3.713
Var. (S ²)	na	0.863	na	na	na	2.761	0.131	0.092
SEM	na	0.416	na	na	na	1.175	0.209	0.175

EM01 Average

Total N	8
Site Mean	5.583
Var. (S ²)	2.312
SEM	0.760

EM02 Average

Total N	8
Site Mean	3.988
Var. (S ²)	0.167
SEM	0.236

Site Average

Total N	16
Site Mean	4.786
Var. (S ²)	1.273
SEM	0.798

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
SITE 36 (W-4) (0.46 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
DATE	2.349	3.677	6.540			6.433	3.799	3.400
08/08/00		5.094				3.596	5.032	4.697
		4.962					4.943	3.996
		5.102						
STUDY DAY		3.824						
111								
STAGE								
37								

Individual Statistics

N	1	5	1	0	0	2	3	3
Mean	2.349	4.532	6.540	na	na	5.015	4.591	4.031
Var. (S ²)	na	0.514	na	na	na	4.026	0.472	0.422
SEM	na	0.321	na	na	na	1.419	0.397	0.375

EM01 Average

Total N	7
Site Mean	4.473
Var. (S ²)	4.393
SEM	1.210

EM02 Average

Total N	8
Site Mean	4.546
Var. (S ²)	0.243
SEM	0.285

Site Average

Total N	15
Site Mean	4.510
Var. (S ²)	0.003
SEM	0.036

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 37 (EW-3) (30.0 mg/kg Sediment PCB Concentration)

	TP01-1	TP01-2	TP01-3	TP01-4
	1.459			
DATE	1.236			
05/09/00	1.181			
	1.601			
STUDY DAY	1.649			
0	1.514			
	1.568			
STAGE	1.294			
20	1.618			
	1.571			

Individual Statistics

N	10	0	0	0
Mean	1.469	na	na	na
Var. (S ²)	0.029	na	na	na
SEM	0.054	na	na	na

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 37 (EW-3) (30.0 mg/kg Sediment PCB Concentration)

	TP01-1	TP01-2	TP01-3	TP01-4
	2.123			
DATE	1.676			
05/19/00	1.985			
	1.543			
STUDY DAY	1.815			
10	2.162			
	1.668			
STAGE	1.929			
21	1.994			

Individual Statistics

N	9	0	0	0
Mean	1.877	na	na	na
Var. (S ²)	0.046	na	na	na
SEM	0.072	na	na	na

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 37 (EW-3) (30.0 mg/kg Sediment PCB Concentration)

	TP01-1	TP01-2	TP01-3	TP01-4
	2.027			
DATE	1.750			
05/26/00	2.149			
	2.160			
STUDY DAY	1.582			
17	2.092			
	2.011			
STAGE	1.880			
21				

Individual Statistics

N	8	0	0	0
Mean	1.956	na	na	na
Var. (S ²)	0.042	na	na	na
SEM	0.072	na	na	na

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 37 (EW-3) (30.0 mg/kg Sediment PCB Concentration)

	TP01-1	TP01-2	TP01-3	TP01-4
	1.912			
DATE	1.941			
05/31/00	2.247			
STUDY DAY				
22				
STAGE				
22				

Individual Statistics

N	3	0	0	0
Mean	2.033	na	na	na
Var. (S ²)	0.034	na	na	na
SEM	0.107	na	na	na

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 39 (W-1) (0.15 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	0.854	0.808	0.793	0.949
DATE	0.851	0.595	0.781	0.985
04/25/00	0.949	0.777	0.871	0.916
	0.862	0.922	0.709	0.932
STUDY DAY	0.795	0.943	0.711	0.936
0	0.974	0.916	0.954	0.915
	0.834	0.895	0.975	0.777
STAGE	0.849	0.922	0.963	0.842
21	0.895	1.010	0.888	0.996
	0.809	0.984	0.881	0.906
	0.930	0.958	0.936	0.923
	0.894	0.963	0.888	0.936
	0.991	0.963	0.900	0.969
	0.930	0.954	0.893	0.975
	0.864	0.881	1.030	0.971
	0.845	0.912	0.908	1.036
	0.993	0.972	0.945	0.927
	0.915	0.917	0.881	1.077
	0.771	1.005	0.990	0.945
	0.943	0.970	1.000	0.896
	0.893	0.956	0.949	0.984
	0.849	0.908	0.916	0.908
	0.833	0.812	0.758	0.860
	0.819	0.910	0.767	1.032
	0.910	0.732	0.864	1.036
	0.870			
	0.836			
	0.716			
	0.916			
	0.938			
<hr/>				
Individual Statistics				
N	30	25	25	25
Mean	0.878	0.903	0.886	0.945
Var. (S ²)	0.004	0.009	0.008	0.004
SEM	0.012	0.019	0.018	0.013
Site Average				
Total N	105			
Site Mean	0.903			
Var. (S ²)	0.001			
SEM	0.015			

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 39 (W-1) (0.15 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	1.271	1.434	1.497	1.440
DATE	1.271	1.222	1.281	1.280
05/02/00	1.365	1.182	1.386	1.413
	1.330	1.237	1.331	1.459
STUDY DAY	1.423	1.242	1.398	1.369
7	1.290	1.294	1.482	1.518
	1.290	1.271	1.578	1.473
STAGE	1.402	1.288	1.401	1.429
22	1.348	1.326	1.484	1.531
	1.467	1.396	1.432	1.432
	1.369	1.275	1.471	1.431
	1.330	1.458	1.363	1.425
	1.244	1.049	1.232	1.377
	1.347	1.362	1.523	1.406
	1.296	1.363	1.410	1.368
	1.418	1.509	1.435	1.466
	1.338	1.444	1.501	1.426
	1.248	1.418	1.444	1.511
	1.306	1.365	1.265	1.467
	1.355	1.373	1.255	1.477
	1.314	1.348	1.304	1.340
	1.418	1.471	1.301	1.262
	1.294	1.391	1.298	1.432
	1.397	1.423	1.544	1.334
	1.231	1.458	1.316	1.391
	1.222			
	1.267			
	1.480			
	1.294			
	1.181			
<hr/>				
Individual Statistics				
N	30	25	25	25
Mean	1.327	1.344	1.397	1.418
Var. (S ²)	0.005	0.011	0.010	0.005
SEM	0.013	0.021	0.020	0.014
Site Average				
Total N	105			
Site Mean	1.372			
Var. (S ²)	0.002			
SEM	0.022			

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 39 (W-1) (0.15 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	1.300	1.150	1.226	1.250
DATE	1.241	1.319	1.293	1.377
05/08/00	1.312	1.431	1.420	1.439
	1.476	1.399	1.202	1.304
STUDY DAY	1.325	1.355	1.465	1.377
13	1.279	1.277	1.283	1.383
	1.476	1.483	1.297	1.241
STAGE	1.275	1.287	1.273	1.308
22	1.450	1.331	1.180	1.316
	1.526	1.315	1.279	1.312
	1.408	1.305	1.447	1.353
	1.198	1.381	1.456	1.310
	1.391	1.125	1.439	1.423
	1.300	1.266	1.425	1.526
	1.432	1.129	1.297	1.135
	1.290	1.398	1.254	
	1.389	1.450	1.399	
	1.325	1.445		
	1.304	1.393		
	1.355	1.369		
	1.287	1.160		
	1.480	1.188		
	1.414	1.423		
	1.298	1.420		
	1.160	1.316		
	1.273			
	1.297			
	1.355			
	1.287			
	1.331			
<hr/>				
Individual Statistics				
N	30	25	17	15
Mean	1.341	1.325	1.332	1.337
Var. (S ²)	0.008	0.011	0.009	0.009
SEM	0.016	0.021	0.023	0.024
Site Average				
Total N	87			
Site Mean	1.334			
Var. (S ²)	0.000			
SEM	0.004			

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 39 (W-1) (0.15 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	2.541		2.520	2.138
DATE	1.804			2.197
05/19/00	2.163			1.443
	1.818			1.670
STUDY DAY	1.718			1.885
24				1.738
				1.856
STAGE				2.045
23				1.988
				2.081
				1.707
				1.878

Individual Statistics

N	5	0	1	12
Mean	2.009	na	2.520	1.885
Var. (S ²)	0.117	na	na	0.048
SEM	0.153	na	na	0.063

Site Average

Total N	18
Site Mean	2.138
Var. (S ²)	0.113
SEM	0.194

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 39 (W-1) (0.15 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	1.561		3.802	1.833
DATE	1.664			1.928
05/26/00	2.099			1.893
	1.923			1.669
STUDY DAY				1.799
31				1.906
				1.826
STAGE				1.631
23				1.736
				1.965
				2.172
				1.960

Individual Statistics

N	4	0	1	12
Mean	1.812	na	3.802	1.860
Var. (S ²)	0.060	na	na	0.021
SEM	0.122	na	na	0.042

Site Average

Total N	17
Site Mean	2.491
Var. (S ²)	1.289
SEM	0.655

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 39 (W-1) (0.15 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	1.579		3.978	1.725
DATE	2.058			2.013
05/31/00	1.709			1.884
	1.943			1.886
STUDY DAY				1.985
36				1.766
				1.691
STAGE				1.541
24				1.872
				1.805
				2.062

Individual Statistics

N	4	0	1	11
Mean	1.822	na	3.978	1.839
Var. (S ²)	0.047	na	na	0.024
SEM	0.109	na	na	0.046

Site Average

Total N	16
Site Mean	2.546
Var. (S ²)	1.537
SEM	0.716

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 39 (W-1) (0.15 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	3.087		4.717	2.499
DATE	2.481			2.216
06/13/00	2.686			2.444
	1.789			1.941
STUDY DAY				2.236
49				2.739
				2.325
STAGE				2.043
25				2.125
				2.479
				2.583

Individual Statistics

N	4	0	1	11
Mean	2.511	na	4.717	2.330
Var. (S ²)	0.295	na	na	0.059
SEM	0.271	na	na	0.073

Site Average

Total N	16
Site Mean	3.186
Var. (S ²)	1.767
SEM	0.767

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 39 (W-1) (0.15 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	5.856			3.024
DATE	3.313			2.371
07/05/00	3.235			2.564
	2.359			2.570
STUDY DAY				3.217
71				2.814
				2.841
STAGE				3.767
27				3.584
				3.406
				3.748

Individual Statistics

N	4	0	0	11
Mean	3.691	na	na	3.082
Var. (S ²)	2.271	na	na	0.246
SEM	0.753	na	na	0.149

Site Average

Total N	15
Site Mean	3.387
Var. (S ²)	0.185
SEM	0.304

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

SITE 39 (W-1) (0.15 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4
	6.055			4.191
DATE	3.662			3.186
08/08/00	3.145			2.987
	3.642			2.876
STUDY DAY				4.286
105				3.174
				3.578
STAGE				4.733
40				3.495
				3.835

Individual Statistics

N	4	0	0	10
Mean	4.126	na	na	3.634
Var. (S ²)	1.711	na	na	0.379
SEM	0.654	na	na	0.195

Site Average

Total N	14
Site Mean	3.880
Var. (S ²)	0.121
SEM	0.246

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

R3 (External Reference) LARVAE IN REFERENCE SITE 40 (MP) (0.04 mg/kg Sediment PCB Concentration)
(Larvae maintained in FETAX solution until Site MP water was received on May 30, 2000)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	1.061	1.102	1.058	1.031	1.003	1.163	1.206	1.099
DATE	1.003	0.982	1.046	0.911	1.048	1.041	1.089	0.937
05/24/00	0.957	0.934	0.959	1.006	0.982	0.955	1.116	0.888
	1.041	1.007	1.170	0.669	0.945	1.101	1.102	1.037
STUDY DAY	0.896	0.934	1.061	0.972	0.967	1.058	1.187	1.011
0	1.002	1.028	1.111	1.007	1.019	1.050	1.024	1.025
	1.118	1.038	1.069	0.959	0.928	0.923	1.033	1.047
STAGE	0.832	0.982	1.139	0.917	1.047	1.047	1.046	0.872
20	0.950	0.979	1.093	0.982	1.040	0.845	0.834	1.006
	1.007	1.034	0.923	0.950	1.159	0.982	1.019	1.025
	0.986	0.958	1.010	0.944	1.072	0.925	1.033	0.943
	1.133	0.780	1.028	1.072	1.007	1.037	0.970	1.080
	1.002	1.096	1.021	1.081	1.046	1.117	1.022	0.865
	1.047	0.996	1.072	1.093	1.031	1.010	0.917	1.061
	0.937	0.806	1.011	1.096	1.047	1.195	0.923	0.972
	1.131	0.862	1.131	1.014	1.117	1.125	1.112	1.065
	1.093	1.059	1.007	1.028	1.010	0.982	0.959	0.979
	1.193	1.044	1.041	1.033	1.011	1.022	1.024	1.308
	1.087	0.972	1.155	0.985	1.031	1.140	1.046	1.028
	1.096	0.907	0.727	0.975	1.028	1.072	0.976	1.080

Individual Statistics

N	20	20	20	20	20	20	20	20
Mean	1.029	0.975	1.042	0.986	1.027	1.039	1.032	1.016
Var. (S ²)	0.008	0.007	0.009	0.009	0.003	0.008	0.008	0.010
SEM	0.020	0.019	0.022	0.021	0.012	0.020	0.020	0.022

EM01 Average

Total N	80
Site Mean	1.008
Var. (S ²)	0.001
SEM	0.016

EM02 Average

Total N	80
Site Mean	1.029
Var. (S ²)	0.000
SEM	0.005

Site Average

Total N	160
Site Mean	1.018
Var. (S ²)	0.000
SEM	0.010

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

R3 (External Reference) LARVAE IN REFERENCE SITE 40 (MP) (0.04 mg/kg Sediment PCB Concentration)

(Larvae maintained in FETAX solution until Site MP water was received on May 30, 2000)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	1.247	1.478	1.514	1.621	2.140	1.399	1.605	1.556
DATE	1.354	1.438	1.328	1.258	1.735	1.373	1.529	1.468
05/31/00	1.185	1.436	1.489	1.363	1.690	1.380	1.575	1.486
	1.504	1.270	1.538	1.457	1.351	1.463	1.525	1.382
STUDY DAY	1.634	1.439	1.533	1.542	1.540	1.418	1.553	1.350
7	1.735	1.595	1.643	1.351	1.501	1.468	1.547	1.538
	1.866	1.456	1.675	1.379	1.488	1.360	1.586	1.645
STAGE	1.189	1.659	1.521	1.664	1.486	1.281	1.616	1.612
23	1.095	1.548	1.621	1.721	1.856	1.358	1.522	1.462
	1.378	1.496	1.646	1.581	1.496	1.389	1.693	1.607
	1.282	1.368	1.420	1.621	1.455	1.410	1.370	1.368
	1.515	1.325	1.247	1.547	1.517	1.537	1.595	1.190
	1.393	1.344	1.451	1.581	1.470	1.596	1.462	1.559
	1.351	1.522	1.498	1.498	1.622	1.373	1.546	1.547
	1.382	1.460	1.364	1.486	1.384	1.357	1.746	1.635
	1.337	1.372	1.506	1.701	1.585	1.330	1.245	1.525
	1.448	1.325	1.304	1.572		1.582	1.542	1.521
	1.475	1.154				1.422		1.594
	1.525							1.404
	1.529							

Individual Statistics

N	20	18	17	17	16	18	17	19
Mean	1.421	1.427	1.488	1.526	1.582	1.416	1.545	1.497
Var. (S ²)	0.035	0.015	0.015	0.017	0.039	0.007	0.013	0.014
SEM	0.042	0.029	0.030	0.032	0.049	0.020	0.027	0.027

EM01 Average

Total N	72
Site Mean	1.466
Var. (S ²)	0.003
SEM	0.025

EM02 Average

Total N	70
Site Mean	1.510
Var. (S ²)	0.005
SEM	0.036

Site Average

Total N	142
Site Mean	1.488
Var. (S ²)	0.001
SEM	0.022

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

R3 (External Reference) LARVAE IN REFERENCE SITE 40 (MP) (0.04 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	1.869	2.356	2.414	2.327	2.361	2.351	2.205	2.502
DATE	2.113	2.038	2.671	2.274	2.636	2.283	2.791	2.594
06/13/00	2.274	2.381	2.197	2.165	2.501	2.613	2.712	2.655
	2.100	2.186	2.371	2.287	2.660	2.472	2.812	3.117
STUDY DAY	2.227	2.360	2.404	2.469	2.542	2.434	2.509	2.400
20	2.287	2.339	2.954	2.670	2.517	2.735	2.192	2.347
	2.110	2.388	1.868	2.098	2.465	1.972	2.563	2.450
STAGE	2.238	1.996	2.142	2.367	2.659	2.238	2.450	2.222
25	2.215	1.998	1.823	2.194	2.360	2.256	2.297	2.182
	1.946	2.164	2.131	2.447	2.523	2.271	2.346	2.295
	2.290	2.246	2.186	2.367	2.232	2.555	2.492	2.212
	2.224	2.556	2.307	2.490	2.332	2.232	2.656	2.277
	1.980	2.408	2.351	1.968	2.596	2.367	2.550	2.133
	2.028	2.280	2.361	2.198	2.637	2.038	1.847	2.227
	2.150	2.239	2.384	1.674	2.592	2.153	1.913	1.946
	1.960	2.194	2.366	2.182		2.153	2.405	1.984
	1.864	2.473	2.014	2.257		2.612	2.273	2.053
	2.134					2.074		1.782
	2.112							2.200
	2.473							

Individual Statistics

N	20	17	17	17	15	18	17	19
Mean	2.130	2.271	2.291	2.261	2.507	2.323	2.413	2.294
Var. (S ²)	0.024	0.026	0.074	0.050	0.018	0.046	0.075	0.088
SEM	0.035	0.039	0.066	0.054	0.034	0.050	0.067	0.068

EM01 Average

Total N	71
Site Mean	2.238
Var. (S ²)	0.005
SEM	0.037

EM02 Average

Total N	69
Site Mean	2.384
Var. (S ²)	0.009
SEM	0.048

Site Average

Total N	140
Site Mean	2.311
Var. (S ²)	0.011
SEM	0.073

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

R3 (External Reference) LARVAE IN REFERENCE SITE 40 (MP) (0.04 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	3.920	3.273	3.207	5.102	2.818	3.427	3.048	3.489
DATE	3.189	4.271	3.148	3.373	2.982	3.887	3.218	3.224
07/05/00	4.199	3.393	2.812	3.349	3.699	3.976	2.879	3.248
	3.441	2.772	4.583	2.836	3.578	3.800	3.940	3.672
STUDY DAY	4.251	3.329	3.588	2.966	3.887	4.402	3.931	4.791
42	3.002	3.837	3.183	3.349	2.478	4.186	3.275	3.666
	3.670	4.664	3.645	3.950	3.021	4.081	3.866	3.513
STAGE	3.727	3.689	2.502	2.989	4.098	3.401	4.482	3.328
29	3.193	5.386	3.662	2.739	2.929	4.786	4.159	3.670
	4.274	3.573	2.905	2.736	2.488	3.658	4.526	3.949
	3.630	3.532	2.845	2.841	3.501	3.967	3.808	3.334
	2.516	3.373	3.687	3.587	2.950	3.541	3.586	3.974
	4.647	3.423	3.884	3.594	3.299	4.447	4.898	3.506
	3.607	4.237	2.752	3.942	3.643	3.351	4.548	4.343
	3.163	3.374	4.946	3.468	3.692	3.132	2.286	2.887
	4.796	3.010	3.130	4.196		3.550	3.395	2.904
	3.701		3.298			3.613	3.599	3.126
	3.409					4.362		3.412
	3.432							
	3.664							

Individual Statistics

N	20	16	17	16	15	18	17	18
Mean	3.671	3.696	3.399	3.439	3.271	3.865	3.732	3.558
Var. (S ²)	0.313	0.433	0.414	0.403	0.252	0.201	0.464	0.230
SEM	0.125	0.164	0.156	0.159	0.130	0.106	0.165	0.113

EM01 Average

Total N	69
Site Mean	3.551
Var. (S ²)	0.024
SEM	0.077

EM02 Average

Total N	68
Site Mean	3.606
Var. (S ²)	0.066
SEM	0.128

Site Average

Total N	137
Site Mean	3.579
Var. (S ²)	0.002
SEM	0.028

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

R3 (External Reference) LARVAE IN REFERENCE SITE 40 (MP) (0.04 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	3.324	4.054	2.979	3.792	3.890	5.081	4.285	5.115
DATE	4.023	3.799	3.620	3.467	3.872	3.727	2.755	3.863
07/11/00	3.964	3.261	3.393	5.739	3.638	4.018	3.886	3.853
	3.116	3.359	3.691	3.473	4.373	4.079	3.585	3.487
STUDY DAY	4.295	3.266	5.058	3.413	3.259	3.523	2.760	3.819
48	4.386	3.855	4.501	3.484	3.362	3.961	4.641	3.769
	3.764	3.233	3.053	3.347	3.567	3.701	3.909	3.812
STAGE	4.509	4.204	3.179	3.228	3.028	3.675	4.713	3.447
30	3.732	3.981	3.235	3.675	2.299	4.748	3.886	3.357
	3.157	5.218	3.913	3.258	3.692	3.952	4.685	4.045
	3.054	3.701	3.519	3.239	3.306	3.902	4.025	4.276
	3.132	3.250	3.570	3.767	3.668	3.814	4.217	2.984
	4.747	3.947	3.805	3.705	4.439	3.635	5.647	3.490
	3.753	3.788	4.391	4.345	3.808	3.938	3.943	5.165
	3.525	5.674	2.833	3.949	3.658	4.363	2.264	3.862
	3.559	3.628	3.285	3.826		3.663	3.543	3.260
	4.802		3.836			4.181	4.132	3.684
	5.167					3.575		3.658
	3.314							
	3.362							

Individual Statistics

N	20	16	17	16	15	18	17	18
Mean	3.834	3.889	3.639	3.732	3.591	3.974	3.934	3.830
Var. (S^2)	0.400	0.475	0.342	0.376	0.271	0.168	0.669	0.317
SEM	0.141	0.172	0.142	0.153	0.135	0.097	0.198	0.133

EM01 Average

Total N	69
Site Mean	3.773
Var. (S^2)	0.012
SEM	0.055

EM02 Average

Total N	68
Site Mean	3.832
Var. (S^2)	0.030
SEM	0.086

Site Average

Total N	137
Site Mean	3.803
Var. (S^2)	0.002
SEM	0.029

HOUSATONIC RIVER PROJECT

RANA pipiens DEVELOPMENTAL STUDY 2000

GROWTH DATA (Length in cm)

R3 (External Reference) LARVAE IN REFERENCE SITE 40 (MP) (0.04 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	4.749	4.107	5.539	4.061	3.815	4.173	4.502	4.932
DATE	3.323	5.180	3.440	4.210	3.682	3.831	5.523	4.986
08/08/00	3.052	4.687	3.657	4.109	4.326	4.644	4.233	5.690
	4.007	4.742	4.868	5.411	3.246	4.672	2.739	3.775
STUDY DAY	5.520	4.600	4.043	3.673	3.583	5.941	4.343	3.208
76	5.334	4.324	3.736	4.493	3.385	4.025	5.068	4.293
	4.297	4.055	4.657	4.102	4.772	4.683	5.171	3.783
STAGE	5.273	5.301	3.286	3.058	5.046	3.881	6.426	4.327
38	3.311	3.263	4.528	3.179	4.142	4.214	5.343	4.028
	5.034	5.186	4.135	3.761	4.074	4.517	4.028	4.217
	3.832	6.018	3.840	3.129	3.608	3.728	3.370	4.278
	4.638	3.823	4.940	3.687	2.859	5.727	4.102	4.072
	4.327	4.786	3.887	3.695	3.240	2.836	4.041	3.595
		4.510	3.645	5.280	3.245	4.672	4.125	4.862
		5.055	5.471	5.081	3.836	4.350	5.656	4.989
				4.541		4.298	5.277	3.773
						4.102		4.517
						4.124		

Individual Statistics

N	13	15	15	16	15	18	16	17
Mean	4.361	4.642	4.245	4.092	na	4.357	4.622	4.313
Var. (S ²)	0.676	0.460	0.512	0.530	0.361	0.488	0.876	0.393
SEM	0.228	0.175	0.185	0.182	0.155	0.165	0.234	0.152

EM01 Average

Total N	59
Site Mean	4.335
Var. (S ²)	0.054
SEM	0.116

EM02 Average

Total N	66
Site Mean	4.430
Var. (S ²)	0.028
SEM	0.096

Site Average

Total N	125
Site Mean	4.383
Var. (S ²)	0.005
SEM	0.048

Crossover Study

Raw Data:

Mortality/Metamorphosis

Larval Stage/Malformations

Larval Growth

Hypothesis Testing Tables

**HOUSATONIC RIVER PROJECT
CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000
MORTALITY/METAMORPH DATA SUMMARY**

R1 Ref. Larvae in Site W-8 (120.0 mg/Kg Sed. PCB) Reps=4, 128 Days*					
DAY	% Mortality	SEM	% Metamorph	SEM	N
0	0.00	0.00	0.00	0.00	39
10	0.00	0.00	0.00	0.00	
17	5.56	5.56	0.00	0.00	
22	13.61	10.54	0.00	0.00	
35	31.11	5.03	0.00	0.00	
57	31.11	5.03	0.00	0.00	
63	31.11	5.03	0.00	0.00	
91	48.89	6.62	2.50	2.50	
108	54.17	5.83	5.28	3.06	
128	56.67	4.08	5.28	3.06	
Cumulative	56.67	4.08	5.28	3.06	

R3 Ref. Larvae in Site W-8 (120.0 mg/Kg Sed. PCB) Reps=4, 113 Days*					
DAY	% Mortality	SEM	% Metamorph	SEM	N
0	0.00	0.00	0.00	0.00	80
7	6.25	2.39	0.00	0.00	
20	10.00	2.04	0.00	0.00	
42	12.50	3.23	0.00	0.00	
48	12.50	3.23	0.00	0.00	
76	12.50	3.23	0.00	0.00	
84	12.50	3.23	0.00	0.00	
96	16.25	5.54	7.50	1.44	
105	20.00	7.91	8.75	1.25	
113	32.50	4.33	8.75	1.25	
Cumulative	32.50	4.33	8.75	1.25	

REFERENCE SITE DATA SHARED WITH DEVELOPMENTAL STUDY					
R3 Ref. Larvae in Ref. Site MP (0.04 mg/Kg Sed. PCB) Reps=8, 113 Days*					
DAY	% Mortality	SEM	% Metamorph	SEM	N
0	0.00	0.00	0.00	0.00	160
7	11.25	1.25	0.00	0.00	
20	12.50	1.25	0.00	0.00	
42	14.38	0.63	0.00	0.00	
48	14.38	0.63	0.00	0.00	
76	21.88	4.38	0.00	0.00	
84	22.50	5.00	2.50	0.00	
96	25.00	3.75	5.63	1.88	
113	43.75	1.25	5.63	1.88	
Cumulative	43.75	1.25	5.63	1.88	

Metamorph Data Summary of Additional R3 Specimens			
R3 in Dechlorinated Tap Water, Reps=4			
	% Metamorph	SEM	N
Cumulative	62.50	6.69	160

*Test Duration.

HOUSATONIC RIVER PROJECT
CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
R1 REFERENCE LARVAE IN SITE 33 (W-8) WATER/SEDIMENT, 120.0 mg/Kg SEDIMENT PCB

EM01-1														EM01-2														EM01-3														EM01-4														CUMULATIVE MORTALITY STATISTICS					CUMULATIVE METAMORPH STATISTICS				
NO.	CUMUL.	CUMUL.	CUMUL.	%	%	NO.	CUMUL.	CUMUL.	CUMUL.	%	%	NO.	CUMUL.	CUMUL.	CUMUL.	%	%	NO.	CUMUL.	CUMUL.	CUMUL.	%	%	NO.	CUMUL.	CUMUL.	CUMUL.	%	%	MEAN	VAR (S2)	SEM	CV (%)	MEAN	VAR (S2)	SEM	CV (%)																												
DATE	DAY	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	DEAD	LIVE	METAM.	DEAD	DEAD	DEAD	LIVE	METAM.	DEAD	DEAD	DEAD	DEAD	LIVE	METAM.	DEAD	DEAD	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	METAM.	DEAD	METAM.	DEAD	METAM.	DEAD	METAM.																											
5/9/2000	0	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na																													
5/11/2000	3	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na																														
5/12/2000	0	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na																														
5/15/2000	6	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na																														
5/17/2000	8	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na																														
5/19/2000	10	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na																														
5/22/2000	13	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na																														
5/23/2000	14	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na																														
5/24/2000	15	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na																														
5/25/2000	16	0	0	10	0.00	0.00	0	0	10	0.00	0.00	1	1	8	11.11	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	2.78	30.86	2.78	200.00	0.00	0.00	0.00	na																															
5/26/2000	17	0	0	10	0.00	0.00	0	0	10	0.00	0.00	1	2	7	22.22	0.00	0	0	10	0.00	0.00	0	0	10	0.00	0.00	5.56	123.46	5.56	200.00	0.00	0.00	0.00	na																															
5/30/2000	21	0	0	10	0.00	0.00	0	0	10	0.00	0.00	2	4	5	44.44	0.00	1	1	9	10.00	0.00	1	1	9	10.00	0.00	13.61	444.75	10.54	154.94	0.00	0.00	0.00	na																															
5/31/2000	22	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	4	5	44.44	0.00	0	1	9	10.00	0.00	0	1	9	10.00	0.00	13.61	444.75	10.54	154.94	0.00	0.00	0.00	na																															
6/1/2000	23	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	4	5	44.44	0.00	0	1	9	10.00	0.00	0	1	9	10.00	0.00	13.61	444.75	10.54	154.94	0.00	0.00	0.00	na																															
6/2/2000	24	0	0	10	0.00	0.00	0	0	10	0.00	0.00	0	4	5	44.44	0.00	0	1	9	10.00	0.00	0	1	9	10.00	0.00	13.61	444.75	10.54	154.94	0.00	0.00	0.00	na																															
6/5/2000	27	1	1	9	10.00	0.00	1	1	9	10.00	0.00	0	4	5	44.44	0.00	2	3	7	30.00	0.00	2	3	7	30.00	0.00	23.61	281.79	8.39	71.10	0.00	0.00	0.00	na																															
6/6/2000	28	0	1	9	10.00	0.00	0	1	9	10.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	23.61	281.79	8.39	71.10	0.00	0.00	0.00	na																															
6/8/2000	30	0	1	9	10.00	0.00	0	1	9	10.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	23.61	281.79	8.39	71.10	0.00	0.00	0.00	na																															
6/12/2000	34	1	2	8	20.00	0.00	1	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	28.61	133.64	5.78	40.41	0.00	0.00	0.00	na																															
6/13/2000	35	1	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
6/14/2000	36	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
6/15/2000	37	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
6/16/2000	38	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
6/19/2000	41	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
6/20/2000	42	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
6/21/2000	43	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
6/22/2000	44	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
6/23/2000	45	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
6/24/2000	46	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
6/27/2000	49	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
6/28/2000	50	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
6/29/2000	51	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
6/30/2000	52	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
7/1/2000	53	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
7/2/2000	54	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
7/7/2000	59	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
7/10/2000	62	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
7/11/2000	63	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
7/12/2000	64	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
7/13/2000	65	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
7/14/2000	66	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3	7	30.00	0.00	0	3	7	30.00	0.00	31.11	101.23	5.03	32.34	0.00	0.00	0.00	na																															
7/18/2000	70	0	3	7	30.00	0.00	0	2	8	20.00	0.00	0	4	5	44.44	0.00	0	3																																															

HOUSATONIC RIVER PROJECT
CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
R1 REFERENCE LARVAE IN SITE 33 (W-8) WATER/SEDIMENT, 120.0 mg/Kg SEDIMENT PCB

EM01-1								EM01-2								EM01-3								EM01-4								CUMULATIVE					CUMULATIVE				
		NO.	CUMUL.	CUMUL.	%	%				NO.	CUMUL.	CUMUL.	%	%				NO.	CUMUL.	CUMUL.	%	%				NO.	CUMUL.	CUMUL.	%	%		MORTALITY STATISTICS					METAMORPH STATISTICS				
DATE	DAY	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	DEAD	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	DEAD	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	METAM.	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)		
8/28/2000	111	0	6	4		60.00	0.00	0	4	6		40.00	0.00	0	6	3	1	66.67	11.11	0	5	5	1	50.00	10.00	54.17	136.11	5.83	21.54	5.28	37.35	3.06	115.79								
8/29/2000	112	0	6	4		60.00	0.00	0	4	6		40.00	0.00	0	6	3	1	66.67	11.11	0	5	5	1	50.00	10.00	54.17	136.11	5.83	21.54	5.28	37.35	3.06	115.79								
8/30/2000	113	0	6	4		60.00	0.00	0	4	6		40.00	0.00	0	6	3	1	66.67	11.11	0	5	5	1	50.00	10.00	54.17	136.11	5.83	21.54	5.28	37.35	3.06	115.79								
8/31/2000	114	0	6	4		60.00	0.00	0	4	6		40.00	0.00	0	6	3	1	66.67	11.11	0	5	5	1	50.00	10.00	54.17	136.11	5.83	21.54	5.28	37.35	3.06	115.79								
9/1/2000	115	0	6	4		60.00	0.00	0	4	6		40.00	0.00	0	6	3	1	66.67	11.11	0	5	5	1	50.00	10.00	54.17	136.11	5.83	21.54	5.28	37.35	3.06	115.79								
9/5/2000	119	0	6	4		60.00	0.00	1	5	5		50.00	0.00	0	6	3	1	66.67	11.11	0	5	5	1	50.00	10.00	56.67	66.67	4.08	14.41	5.28	37.35	3.06	115.79								
9/6/2000	120	0	6	4		60.00	0.00	0	5	5		50.00	0.00	0	6	3	1	66.67	11.11	0	5	5	1	50.00	10.00	56.67	66.67	4.08	14.41	5.28	37.35	3.06	115.79								
9/7/2000	121	0	6	4		60.00	0.00	0	5	5		50.00	0.00	0	6	3	1	66.67	11.11	0	5	5	1	50.00	10.00	56.67	66.67	4.08	14.41	5.28	37.35	3.06	115.79								
9/8/2000	122	0	6	4		60.00	0.00	0	5	5		50.00	0.00	0	6	3	1	66.67	11.11	0	5	5	1	50.00	10.00	56.67	66.67	4.08	14.41	5.28	37.35	3.06	115.79								
9/11/2000	125	0	6	4		60.00	0.00	0	5	5		50.00	0.00	0	6	3	1	66.67	11.11	0	5	5	1	50.00	10.00	56.67	66.67	4.08	14.41	5.28	37.35	3.06	115.79								
9/12/2000	126	0	6	4		60.00	0.00	0	5	5		50.00	0.00	0	6	3	1	66.67	11.11	0	5	5	1	50.00	10.00	56.67	66.67	4.08	14.41	5.28	37.35	3.06	115.79								
9/13/2000	127	0	6	4		60.00	0.00	0	5	5		50.00	0.00	0	6	3	1	66.67	11.11	0	5	5	1	50.00	10.00	56.67	66.67	4.08	14.41	5.28	37.35	3.06	115.79								
9/14/2000	128	0	6	4		60.00	0.00	0	5	5		50.00	0.00	0	6	3	1	66.67	11.11	0	5	5	1	50.00	10.00	56.67	66.67	4.08	14.41	5.28	37.35	3.06	115.79								

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
R3 REFERENCE LARVAE IN SITE 33 (W-8) WATER/SEDIMENT, 120.0 mg/Kg SEDIMENT PCB

EM01-1										EM01-2										EM01-3										EM01-4										CUMULATIVE					CUMULATIVE				
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)																
5/24/2000	0	0	0	20	0.00	0.00		0	0	20	0.00	0.00		0	0	20	0.00	0.00		0	0	20	0.00	0.00		0.00	0.00	0.00	na	0.00	0.00	0.00	na																
5/25/2000	1	0	0	20	0.00	0.00		0	0	20	0.00	0.00		0	0	20	0.00	0.00		0	0	20	0.00	0.00		0.00	0.00	0.00	na	0.00	0.00	0.00	na																
5/26/2000	2	0	0	20	0.00	0.00		1	1	19	5.00	0.00		1	1	19	5.00	0.00		1	1	19	5.00	0.00		3.75	6.25	1.25	66.67	0.00	0.00	0.00	na																
5/30/2000	6	0	0	20	0.00	0.00		0	1	19	5.00	0.00		0	1	19	5.00	0.00		0	1	19	5.00	0.00		3.75	6.25	1.25	66.67	0.00	0.00	0.00	na																
5/31/2000	7	0	0	20	0.00	0.00		1	2	18	10.00	0.00		1	2	18	10.00	0.00		0	1	19	5.00	0.00		6.25	22.92	2.39	76.59	0.00	0.00	0.00	na																
6/1/2000	8	0	0	20	0.00	0.00		0	2	18	10.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		6.25	22.92	2.39	76.59	0.00	0.00	0.00	na																
6/2/2000	9	0	0	20	0.00	0.00		0	2	18	10.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		6.25	22.92	2.39	76.59	0.00	0.00	0.00	na																
6/5/2000	12	0	0	20	0.00	0.00		0	2	18	10.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		6.25	22.92	2.39	76.59	0.00	0.00	0.00	na																
6/6/2000	13	3	3	17	15.00	0.00		0	2	18	10.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		10.00	16.67	2.04	40.82	0.00	0.00	0.00	na																
6/8/2000	15	0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		10.00	16.67	2.04	40.82	0.00	0.00	0.00	na																
6/9/2000	16	0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		10.00	16.67	2.04	40.82	0.00	0.00	0.00	na																
6/12/2000	19	0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		10.00	16.67	2.04	40.82	0.00	0.00	0.00	na																
6/13/2000	20	0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		10.00	16.67	2.04	40.82	0.00	0.00	0.00	na																
6/14/2000	21	0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		10.00	16.67	2.04	40.82	0.00	0.00	0.00	na																
6/15/2000	22	0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		10.00	16.67	2.04	40.82	0.00	0.00	0.00	na																
6/16/2000	23	0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		10.00	16.67	2.04	40.82	0.00	0.00	0.00	na																
6/19/2000	26	0	3	17	15.00	0.00		1	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		11.25	22.92	2.39	42.55	0.00	0.00	0.00	na																
6/20/2000	27	0	3	17	15.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		11.25	22.92	2.39	42.55	0.00	0.00	0.00	na																
6/21/2000	28	0	3	17	15.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		11.25	22.92	2.39	42.55	0.00	0.00	0.00	na																
6/22/2000	29	0	3	17	15.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		11.25	22.92	2.39	42.55	0.00	0.00	0.00	na																
6/23/2000	30	0	3	17	15.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		11.25	22.92	2.39	42.55	0.00	0.00	0.00	na																
6/26/2000	33	0	3	17	15.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		11.25	22.92	2.39	42.55	0.00	0.00	0.00	na																
6/27/2000	34	0	3	17	15.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		11.25	22.92	2.39	42.55	0.00	0.00	0.00	na																
6/28/2000	35	0	3	17	15.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		11.25	22.92	2.39	42.55	0.00	0.00	0.00	na																
6/29/2000	36	0	3	17	15.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		11.25	22.92	2.39	42.55	0.00	0.00	0.00	na																
6/30/2000	37	0	3	17	15.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		11.25	22.92	2.39	42.55	0.00	0.00	0.00	na																
7/5/2000	42	1	4	16	20.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/6/2000	43	0	4	16	20.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/10/2000	47	0	4	16	20.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/11/2000	48	0	4	16	20.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/12/2000	49	0	4	16	20.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/13/2000	50	0	4	16	20.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/17/2000	54	0	4	16	20.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/18/2000	55	0	4	16	20.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/19/2000	56	0	4	16	20.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/20/2000	57	0	4	16	20.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/21/2000	58	0	4	16	20.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/24/2000	61	0	4	16	20.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/25/2000	62	0	4	16	20.00	0.00		0	3	17	15.00	0.00		0	2	18	10.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/26/2000	63	0	4	16	20.00	0.00		0	3	17	15.00	0.00		0	1	19	5.00	0.00		0	1	19	5.00	0.00		12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																
7/27/2000	64	0	4	16	20.00	0.00		0	3	17	15.00																																						

HOUSATONIC RIVER PROJECT
CROSSOVER RANA *pipiens* DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
R3 REFERENCE LARVAE IN REFERENCE SITE 40 (MP), 0.04 mg/Kg SEDIMENT PCB

EM01-1								EM01-2								EM01-3								EM01-4								CUMULATIVE				CUMULATIVE			
DATE	DAY	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	CUMUL. METAM.	% DEAD	% METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)						
5/24/2000	0	0	0	20		0.00	0.00	0	0	20		0.00	0.00	0	0	20		0.00	0.00	0	0	20		0.00	0.00	0.00	0.00	0.00	0.00	na	0.00	0.00	0.00	na					
5/25/2000	1	0	0	20		0.00	0.00	1	1	19		5.00	0.00	3	3	17		15.00	0.00	1	1	19		5.00	0.00	6.25	39.58	3.15	100.66	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
5/26/2000	2	0	0	20		0.00	0.00	0	1	19		5.00	0.00	0	3	17		15.00	0.00	1	2	18		10.00	0.00	7.50	41.67	3.23	86.07	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
5/30/2000	6	0	0	20		0.00	0.00	0	1	19		5.00	0.00	0	3	17		15.00	0.00	0	2	18		10.00	0.00	7.50	41.67	3.23	86.07	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
5/31/2000	7	0	0	20		0.00	0.00	1	2	18		10.00	0.00	0	3	17		15.00	0.00	1	3	17		15.00	0.00	10.00	50.00	3.54	70.71	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/1/2000	8	0	0	20		0.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	10.00	50.00	3.54	70.71	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/2/2000	9	0	0	20		0.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	10.00	50.00	3.54	70.71	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/5/2000	12	0	0	20		0.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	10.00	50.00	3.54	70.71	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/6/2000	13	0	0	20		0.00	0.00	1	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/8/2000	15	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/9/2000	16	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/12/2000	19	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/13/2000	20	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/14/2000	21	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/15/2000	22	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/16/2000	23	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/19/2000	26	0	0	20		0.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	11.25	56.25	3.75	66.67	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/20/2000	27	0	0	20		0.00	0.00	1	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/21/2000	28	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/22/2000	29	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/23/2000	30	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/26/2000	33	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/27/2000	34	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/28/2000	35	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/29/2000	36	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
6/30/2000	37	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	3	17		15.00	0.00	12.50	75.00	4.33	69.28	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
7/5/2000	42	0	0	20		0.00	0.00	0	4	16		20.00	0.00	1	4	16		20.00	0.00	1	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
7/6/2000	43	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
7/10/2000	47	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
7/11/2000	48	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
7/12/2000	49	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
7/13/2000	50	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
7/17/2000	54	0	0	20		0.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	13.75	89.58	4.73	68.84	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
7/18/2000	55	15	5	5		25.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	20.00	16.67	2.04	20.41	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
7/19/2000	56	0	5	15		25.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	20.00	16.67	2.04	20.41	0.00	0.00	0.00	na	0.00	0.00	0.00	na		
7/20/2000	57	1	6	14		30.00	0.00	0	4	16		20.00	0.00	0	3	17		15.00	0.00	0	4	16		20.00	0.00	21.25	39.58	3.15	29.61	0.00	0.00	0.00	na	0.00					

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
R3 REFERENCE LARVAE IN REFERENCE SITE 40 (MP), 0.04 mg/Kg SEDIMENT PCB

EM02-1														EM02-2														EM02-3														EM02-4														CUMULATIVE					CUMULATIVE				
		NO.	CUMUL.	CUMUL.	CUMUL.	%	%			NO.	CUMUL.	CUMUL.	CUMUL.	%	%			NO.	CUMUL.	CUMUL.	CUMUL.	%	%			NO.	CUMUL.	CUMUL.	CUMUL.	%	%	MORTALITY STATISTICS					METAMORPH STATISTICS																												
DATE	DAY	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	DEAD	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	DEAD	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	DEAD	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)																										
5/24/2000	0	0	0	20		0.00	0.00	1	0	20		0.00	0.00	0	0	20		0.00	0.00	0	0	20		0.00	0.00	0	0	20		0.00	0.00	2.50	8.33	1.44	115.47	0.00	0.00	0.00	na																										
5/25/2000	1	1	1	19		5.00	0.00	1	1	19		5.00	0.00	0	0	20		0.00	0.00	0	0	20		0.00	0.00	0	0	20		0.00	0.00	6.25	6.25	1.25	40.00	0.00	0.00	0.00	na																										
5/26/2000	2	1	2	18		10.00	0.00	0	1	19		5.00	0.00	1	1	19		5.00	0.00	1	1	19		5.00	0.00	1	1	19		5.00	0.00	8.75	22.92	2.39	54.71	0.00	0.00	0.00	na																										
5/30/2000	6	1	3	17		15.00	0.00	0	1	19		5.00	0.00	1	2	18		10.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																										
5/31/2000	7	1	4	16		20.00	0.00	1	2	18		10.00	0.00	1	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																										
6/1/2000	8	0	4	16		20.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																										
6/2/2000	9	0	4	16		20.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																										
6/5/2000	12	0	4	16		20.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	12.50	41.67	3.23	51.64	0.00	0.00	0.00	na																										
6/6/2000	13	1	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/8/2000	15	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/9/2000	16	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/12/2000	19	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/13/2000	20	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/14/2000	21	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/15/2000	22	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/16/2000	23	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/19/2000	26	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/20/2000	27	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/21/2000	28	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/22/2000	29	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/23/2000	30	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/26/2000	33	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	1	19		5.00	0.00	0	1	19		5.00	0.00	13.75	72.92	4.27	62.10	0.00	0.00	0.00	na																										
6/27/2000	34	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	1	2	18		10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na																																
6/28/2000	35	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	2	18		10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na																																
6/29/2000	36	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	2	18		10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na																																
6/30/2000	37	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	2	18		10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na																																
7/5/2000	42	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	2	18		10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na																																
7/6/2000	43	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	2	18		10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na																																
7/7/2000	44	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	2	18		10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na																																
7/10/2000	47	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	2	18		10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na																																
7/11/2000	48	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	2	18		10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na																																
7/12/2000	49	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	2	18		10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na																																
7/13/2000	50	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	2	18		10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na																																
7/17/2000	54	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	3	17		15.00	0.00	0	2	18		10.00	0.00	15.00	50.00	3.54	47.14	0.00	0.00	0.00	na																																
7/18/2000	55	0	5	15		25.00	0.00	0	2	18		10.00	0.00	1	4	16		20.00	0.00	0	2	18		10.00	0.00	16.25	56.25	3.75	46.15	0.00	0.00	0.00	na																																
7/19/2000	56	0	5	15		25.00	0.00	0	2	18		10.00	0.00	0	4	16		20.00	0.00	0	2	18		10.00	0.00	16.25	56.25	3.75	46.15	0.00	0.00	0.00	na																																
7/20/2000	57	0																																																															

HOUSATONIC RIVER PROJECT
CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000 MORTALITY/METAMORPH DATA
R3 REFERENCE LARVAE IN REFERENCE SITE 40 (MP), 0.04 mg/Kg SEDIMENT PCB

COMBINED EGG MASS STATISTICS

		NO. CUMUL. CUMUL. CUMUL. % %						NO. CUMUL. CUMUL. CUMUL. % %						NO. CUMUL. CUMUL. CUMUL. % %						MEAN					MEAN								
DATE	DAY	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	DEAD	DEAD	LIVE	METAM.	DEAD	METAM.	MORTALITY STATISTICS				METAMORPH STATISTICS			
																										MEAN %	VAR (S2)	SEM	CV (%)	MEAN %	VAR (S2)	SEM	CV (%)
5/24/2000	0																									0.00	0.00	0.00	na	0.00	0.00	0.00	na
5/25/2000	1																									4.38	7.03	1.88	60.61	0.00	0.00	0.00	na
5/26/2000	2																									6.88	0.78	0.63	12.86	0.00	0.00	0.00	na
5/30/2000	6																									8.13	0.78	0.63	10.88	0.00	0.00	0.00	na
5/31/2000	7																									11.25	3.13	1.25	15.71	0.00	0.00	0.00	na
6/1/2000	8																									11.25	3.13	1.25	15.71	0.00	0.00	0.00	na
6/2/2000	9																									11.25	3.13	1.25	15.71	0.00	0.00	0.00	na
6/5/2000	12																									11.25	3.13	1.25	15.71	0.00	0.00	0.00	na
6/6/2000	13																									12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/8/2000	15																									12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/9/2000	16																									12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/12/2000	19																									12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/13/2000	20																									12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/14/2000	21																									12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/15/2000	22																									12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/16/2000	23																									12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/19/2000	26																									12.50	3.13	1.25	14.14	0.00	0.00	0.00	na
6/20/2000	27																									13.13	0.78	0.63	6.73	0.00	0.00	0.00	na
6/21/2000	28																									13.13	0.78	0.63	6.73	0.00	0.00	0.00	na
6/22/2000	29																									13.13	0.78	0.63	6.73	0.00	0.00	0.00	na
6/23/2000	30																									13.13	0.78	0.63	6.73	0.00	0.00	0.00	na
6/26/2000	33																									13.13	0.78	0.63	6.73	0.00	0.00	0.00	na
6/27/2000	34																									13.75	3.13	1.25	12.86	0.00	0.00	0.00	na
6/28/2000	35																									13.75	3.13	1.25	12.86	0.00	0.00	0.00	na
6/29/2000	36																									13.75	3.13	1.25	12.86	0.00	0.00	0.00	na
6/30/2000	37																									13.75	3.13	1.25	12.86	0.00	0.00	0.00	na
7/5/2000	42																									14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/6/2000	43																									14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/10/2000	47																									14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/11/2000	48																									14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/12/2000	49																									14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/13/2000	50																									14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/17/2000	54																									14.38	0.78	0.63	6.15	0.00	0.00	0.00	na
7/18/2000	55																									18.13	7.03	1.88	14.63	0.00	0.00	0.00	na
7/19/2000	56																									18.13	7.03	1.88	14.63	0.00	0.00	0.00	na
7/20/2000	57																									18.75	12.50	2.50	18.86	0.00	0.00	0.00	na
7/21/2000	58																									19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
7/24/2000	61																									19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
7/25/2000	62																									19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
7/26/2000	63																									19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
7/27/2000	64																									19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
7/28/2000	65																									19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
7/31/2000	68																									19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
8/1/2000	69																									19.38	19.53	3.13	22.81	0.00	0.00	0.00	na
8/3/2000	71																									20.00	28.13	3.75	26.52	0.00	0.00	0.00	na
8/7/2000	75																									20.00	28.13	3.75	26.52	0.00	0.00	0.00	na
8/8/2000	76																									21.88	38.28	4.38	28.28	0.00	0.00	0.00	na
8/9/2000	77																									21.88	38.28	4.38	28.28	0.00	0.00	0.00	na
8/10/2000	78																									21.88	38.28	4.38	28.28	0.00	0.00	0.00	na
8/11/2000	79																									21.88	38.28	4.38	28.28	0.00	0.00	0.00	na
8/14/2000	82																									21.88	38.28	4.38	28.28	0.00	0.00	0.00	na
8/15/2000	83																									22.50	50.00	5.00	31.43	0.00	0.00	0.00	na
8/16/2000	84																									22.50	50.00	5.00	31.43	2.50	0.00	0.00	0.00
8/17/2000	85																									22.50	50.00	5.00	31.43	0.00	0.00	0.00	na
8/18/2000	86																									22.50	50.00	5.00	31.43	2.50	0.00	0.00	0.00
8/21/2000	89																									23.13	38.28	4.38	26.76	2.50	0.00	0.00	0.00
8/22/2000	90																									23.13	38.28	4.38	26.76	2.50	0.00	0.00	0.00
8/23/2000	91																									23.75	28.13	3.75	22.33	3.75	3.13	1.25	47.14
8/24/2000	92																									23.75	28.13	3.75	22.33	3.75	3.13	1.25	47.14
8/25/2000	93																									23.75	28.13	3.75	22.33	3.75	3.13	1.25	47.14
8/26/2000	96																									25.00	28.13	3.75	21.21	5.63	7.03	1.88	47.14
9/10/2000	109																									43.75	3.13	1.25	4.04	5.63	7.03		

HOUSATONIC RIVER PROJECT
CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000 METAMORPH DATA
R3 REFERENCE LARVAE IN DECHLORINATED (Aged) TAP WATER

FINAL METAMORPH DATA OF ADDITIONAL REFERENCE SPECIMENS CULTURED IN DECHLORINATED TAP WATER

Composited EM01/EM02-1			Composited EM01/EM02-2			Composited EM01/EM02-3			Composited EM01/EM02-4			CUMULATIVE METAMORPH STATISTICS			
Total Number	Number Metamorphed	% Metamorphed	Total Number	Number Metamorphed	% Metamorphed	Total Number	Number Metamorphed	% Metamorphed	Total Number	Number Metamorphed	% Metamorphed	MEAN %	VAR (S2)	SEM	CV (%)
40	20	50.00	40	28	70.00	40	31	77.50	40	21	52.50	62.50	179.17	6.69	21.42

**HOUSATONIC RIVER PROJECT
CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
DATA SUMMARY**

% MALFORMED BY SITE AND STUDY DAY

R1 Ref. Larvae in Site W-8 (120.0 mg/Kg Sed. PCB), 91 Days*				
DAY	STAGE	% MAL.	SEM	EVENT
0	20	0.00	0.00	1
10	22	22.78	4.55	2
17	23	28.83	3.44	3
22	23	20.28	3.86	4
35	24	22.78	4.55	5
57	24	22.78	6.11	6
63	28	25.28	4.72	7
91	28	12.78	2.42	8
Grand Means:		19.06	4.35	

R3 Ref. Larvae in Site W-8 (120.0 mg/Kg Sed. PCB), 76 Days*				
DAY	STAGE	% MAL	SEM	EVENT
0	20	0.00	0.00	1
7	21	18.75	1.25	2
20	24	26.25	2.39	3
42	25	22.50	3.23	4
48	27	28.75	1.25	5
76	32	22.50	4.33	6
Grand Means:		19.79	6.00	

REFERENCE SITE DATA SHARED WITH DEVELOPMENTAL STUDY				
R3 Ref. Larvae in Ref. Site MP (0.04 mg/Kg Sed. PCB), 76 Days*				
DAY	STAGE	% MAL.	SEM	EVENT
0	20	0.00	0.00	1
7	23	0.00	0.00	2
20	25	0.00	0.00	3
42	29	1.25	0.00	4
48	30	16.88	13.13	5
76	38	2.50	2.50	6
Grand Means:		3.44	2.35	

*Test duration.

HOUSATONIC RIVER PROJECT
CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
R1 EXTERNAL REFERENCE LARVAE IN SITE 33 (W-8), 120.0 mg/Kg SEDIMENT PCB

STAGE 20, 5/9/2000, DAY 0

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	10	10	0	0.00												
EM01-2	10	10	0	0.00												
EM01-3	9	9	0	0.00												
EM01-4	10	10	0	0.00												
Total:	39	39	0		0	0	0	0	0	0	0	0	0	0	0	0
Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 22, 5/19/2000, DAY 10

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	10	10	3	30.00	2	3			1							
EM01-2	10	10	3	30.00	3	2			1							
EM01-3	9	9	1	11.11					1							
EM01-4	10	10	2	20.00	1	2			1							
Total:	39	39	9		6	7	0	0	4	0	0	0	0	0	0	0
Means (based on initial larval count):				22.78	15.00	17.50	0.00	0.00	10.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				82.72	1.00	0.33	na	na	0.00	na	na	na	na	na	na	na
SEM				4.55	0.58	0.33	na	na	0.00	na	na	na	na	na	na	na
CV (%)				39.93	6.67	3.30	na	na	0.00	na	na	na	na	na	na	na

STAGE 23, 5/26/2000, DAY 17

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	10	10	3	30.00	2	3			1		1	1				
EM01-2	10	10	2	20.00	2	2			2		1	1				
EM01-3	9	7	3	33.33	1	3			3			1		1		
EM01-4	10	10	2	20.00	1	2			2			1		2	1	
Total:	39	37	10		6	10	0	0	8	0	2	4	0	3	1	0
Means (based on initial larval count):				25.83	15.28	25.83	0.00	0.00	20.83	0.00	5.00	10.28	0.00	7.78	2.50	0.00
Var (S2)				47.22	0.33	0.33	na	na	0.67	na	0.00	0.00	na	0.50	na	na
SEM				3.44	0.29	0.29	na	na	0.41	na	0.00	0.00	na	0.50	na	na
CV (%)				26.60	3.78	2.23	na	na	3.92	na	0.00	0.00	na	9.09	na	na

STAGE 23, 5/31/2000, DAY 22

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	10	10	3	30.00	2	3	3		2		1	1		1		
EM01-2	10	10	2	20.00	2	2	2		1			1		2		
EM01-3	9	5	1	11.11	1	1										
EM01-4	10	9	2	20.00	2	2			1					1		
Total:	39	34	8		7	8	5	0	4	0	1	2	0	4	0	0
Means (based on initial larval count):				20.28	17.78	20.28	12.50	0.00	10.00	0.00	2.50	5.00	0.00	10.00	0.00	0.00
Var (S2)				59.57	0.25	0.67	0.50	na	0.33	na	na	0.00	na	0.33	na	na
SEM				3.86	0.25	0.41	0.50	na	0.33	na	na	0.00	na	0.33	na	na
CV (%)				38.06	2.81	4.03	5.66	na	5.77	na	na	0.00	na	5.77	na	na

HOUSATONIC RIVER PROJECT
CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
R1 EXTERNAL REFERENCE LARVAE IN SITE 33 (W-8), 120.0 mg/Kg SEDIMENT PCB

STAGE 24, 6/13/2000, DAY 35

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	10	7	3	30.00		3	1		2		2	2				
EM01-2	10	8	2	20.00		2	2		1		1	2				
EM01-3	9	5	1	11.11		1	1		1			1				
EM01-4	10	7	3	30.00		2	2					1				
Total:	39	27	9		0	8	6	0	4	0	3	6	0	0	0	0
Means (based on initial larval count):					22.78	0.00	20.28	15.28	0.00	10.28	0.00	7.50	15.28	0.00	0.00	0.00
Var (S2)					82.72	na	0.67	0.33	na	0.33	na	0.50	0.33	na	na	na
SEM					4.55	na	0.41	0.29	na	0.33	na	0.50	0.29	na	na	na
CV (%)					39.93	na	4.03	3.78	na	5.62	na	9.43	3.78	na	na	na

STAGE 24, 7/5/2000, DAY 57

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	10	7	2	20.00		2	2		1			1				
EM01-2	10	8	4	40.00	1	3	1	1			2	2				
EM01-3	9	5	1	11.11	1	1			4		1	1				
EM01-4	10	7	2	20.00	2	2					1	2				
Total:	39	27	9		4	8	3	1	5	0	4	6	0	0	0	0
Means (based on initial larval count):					22.78	10.28	20.28	7.50	2.50	12.50	0.00	10.28	15.28	0.00	0.00	0.00
Var (S2)					149.38	0.33	0.67	0.50	na	4.50	na	0.33	0.33	na	na	na
SEM					6.11	0.33	0.41	0.50	na	1.50	na	0.33	0.29	na	na	na
CV (%)					53.66	5.62	4.03	9.43	na	16.97	na	5.62	3.78	na	na	na

STAGE 28, 7/11/2000, DAY 63

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	10	7	3	30.00		3	2	1	1			2		2		
EM01-2	10	8	3	30.00		3	2	2	2	1		3		1		
EM01-3	9	5	1	11.11		1	1		1							
EM01-4	10	7	3	30.00		3	3		2			2		2		
Total:	39	27	10		0	10	8	3	6	1	0	7	0	5	0	0
Means (based on initial larval count):					25.28	0.00	25.28	20.28	7.50	15.28	2.50	0.00	17.50	0.00	12.50	0.00
Var (S2)					89.20	na	1.00	0.67	0.50	0.33	na	0.33	na	0.33	na	na
SEM					4.72	na	0.50	0.41	0.50	0.29	na	0.33	na	0.33	na	na
CV (%)					37.36	na	3.96	4.03	9.43	3.78	na	3.30	na	4.62	na	na

STAGE 28, 8/8/2000, DAY 91

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	10	4	1	10.00	1	1			1							
EM01-2	10	7	2	20.00	1	2			2			1				
EM01-3	9	4	1	11.11		1			1			1				
EM01-4	10	4	1	10.00		1			1			1				
Total:	39	19	5		2	5	0	0	5	0	0	3	0	0	0	0
Means (based on initial larval count):					12.78	5.00	12.78	0.00	0.00	12.78	0.00	7.78	0.00	0.00	0.00	0.00
Var (S2)					23.46	0.00	0.25	na	na	0.25	na	0.00	na	na	na	na
SEM					2.42	0.00	0.25	na	na	0.25	na	0.00	na	na	na	na
CV (%)					37.90	0.00	3.91	na	na	3.91	na	0.00	na	na	na	na

HOUSATONIC RIVER PROJECT
 CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000
 STAGE/MALFORMATION DATA
 R1 EXTERNAL REFERENCE LARVAE IN SITE 33 (W-8), 120.0 mg/Kg SEDIMENT PCB

GRAND MEANS OF COMBINED LARVAL MALFORMATION DATA

NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
		EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
Grand Means:	19.06	7.92	17.78	6.94	1.25	11.49	0.31	3.16	8.89	0.00	3.78	0.31	0.00
SEM	4.35	3.80	4.14	4.10	1.34	2.94	0.44	2.01	3.44	0.00	2.69	0.44	0.00

**HOUSATONIC RIVER PROJECT
CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
R3 EXTERNAL REFERENCE LARVAE IN SITE 33 (W-8), 120.0 mg/Kg SEDIMENT PCB**

STAGE 20, 5/24/2000, DAY 0

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	20	0	0.00												
EM01-2	20	20	0	0.00												
EM01-3	20	20	0	0.00												
EM01-4	20	20	0	0.00												
Total:	80	80	0		0	0	0	0	0	0	0	0	0	0	0	0
Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 21, 5/31/2000, DAY 7

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	20	4	20.00	2	3			2		2	1	1			
EM01-2	20	18	4	20.00	2	2			3		1		3			
EM01-3	20	18	4	20.00	2	4			1			1	3			
EM01-4	20	19	3	15.00	1	3			3			2	2			
Total:	80	75	15		7	12	0	0	9	0	3	4	9	0	0	0
Means (based on initial larval count):				18.75	8.75	15.00	0.00	0.00	11.25	0.00	3.75	5.00	11.25	0.00	0.00	0.00
Var (S2)				6.25	0.25	0.67	na	na	0.92	na	0.50	0.33	0.92	na	na	na
SEM				1.25	0.25	0.41	na	na	0.48	na	0.50	0.33	0.48	na	na	na
CV (%)				13.33	5.71	5.44	na	na	8.51	na	18.86	11.55	8.51	na	na	na

STAGE 24, 6/13/2000, DAY 20

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	17	6	30.00		6	6		5		1	5				
EM01-2	20	18	4	20.00		4	4		3			4			1	
EM01-3	20	18	6	30.00		6	5		5	2		6			1	
EM01-4	20	19	5	25.00		5	4		1		2	4		1		
Total:	80	72	21		0	21	19	0	14	2	3	19	0	1	2	0
Means (based on initial larval count):				26.25	0.00	26.25	23.75	0.00	17.50	2.50	3.75	23.75	0.00	1.25	2.50	0.00
Var (S2)				22.92	na	0.92	0.92	na	3.67	na	0.50	0.92	na	na	0.00	na
SEM				2.39	na	0.48	0.48	na	0.96	na	0.50	0.48	na	na	0.00	na
CV (%)				18.24	na	3.65	4.03	na	10.94	na	18.86	4.03	na	na	0.00	na

STAGE 25, 7/5/2000, DAY 42

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	16	3	15.00	1	3			3		1	3	1			
EM01-2	20	17	6	30.00	1	5			3			2	2		1	
EM01-3	20	18	4	20.00	1	4			1			1		1	4	
EM01-4	20	19	5	25.00	2	5			1			3			4	
Total:	80	70	18		5	17	0	0	8	0	1	9	3	1	9	0
Means (based on initial larval count):				22.50	6.25	21.25	0.00	0.00	10.00	0.00	1.25	11.25	3.75	1.25	11.25	0.00
Var (S2)				41.67	0.25	0.92	na	na	1.33	na	na	0.92	0.50	na	3.00	na
SEM				3.23	0.25	0.48	na	na	0.58	na	na	0.48	0.50	na	1.00	na
CV (%)				28.69	8.00	4.51	na	na	11.55	na	na	8.51	18.86	na	15.40	na

**HOUSATONIC RIVER PROJECT
CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
R3 EXTERNAL REFERENCE LARVAE IN SITE 33 (W-8), 120.0 mg/Kg SEDIMENT PCB**

STAGE 27, 7/11/2000, DAY 48

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	16	6	30.00		6	6		1		6	3				
EM01-2	20	17	5	25.00		5	4					4	2			
EM01-3	20	18	6	30.00		6	6				3	3		2		
EM01-4	20	19	6	30.00		5	5					4				
Total:	80	70	23		0	22	21	0	1	0	9	14	2	2	0	0
Means (based on initial larval count):				28.75	0.00	27.50	26.25	0.00	1.25	0.00	11.25	17.50	2.50	2.50	0.00	0.00
Var (S2)				6.25	na	0.33	0.92	na	na	na	4.50	0.33	na	na	na	na
SEM				1.25	na	0.29	0.48	na	na	na	1.50	0.29	na	na	na	na
CV (%)				8.70	na	2.10	3.65	na	na	na	18.86	3.30	na	na	na	na

STAGE 32, 8/8/2000, DAY 76

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	16	6	30.00	1	6		2	4		1	4	1			
EM01-2	20	17	5	25.00		5		3			3	2				
EM01-3	20	18	2	10.00		2		1			2	1				
EM01-4	20	19	5	25.00		4		4			2	3				
Total:	80	70	18		1	17	0	10	4	0	8	10	1	0	0	0
Means (based on initial larval count):				22.50	1.25	21.25	0.00	12.50	5.00	0.00	10.00	12.50	1.25	0.00	0.00	0.00
Var (S2)				75.00	na	2.92	na	1.67	na	na	0.67	1.67	na	na	na	na
SEM				4.33	na	0.85	na	0.65	na	na	0.41	0.65	na	na	na	na
CV (%)				38.49	na	8.04	na	10.33	na	na	8.16	10.33	na	na	na	na

GRAND MEANS OF COMBINED LARVAL MALFORMATION DATA

	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)													
			EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED		
Grand Means:	19.79	2.71	18.54	8.33	2.08	7.50	0.42	5.00	11.67	3.13	0.83	2.29	0.00			
SEM	6.00	1.82	5.79	6.11	2.36	3.35	0.47	2.31	4.46	2.02	0.49	2.10	0.00			

HOUSATONIC RIVER PROJECT
 CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000
 STAGE/MALFORMATION DATA
 R3 EXTERNAL REFERENCE LARVAE IN REFERENCE SITE 40 (MP), 0.04 mg/Kg SEDIMENT PCB

STAGE 20, 5/24/2000, DAY 0

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	20	0	0.00												
EM01-2	20	20	0	0.00												
EM01-3	20	20	0	0.00												
EM01-4	20	20	0	0.00												
Total:	80	80	0		0	0	0	0	0	0	0	0	0	0	0	0
Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	20	20	0	0.00												
EM02-2	20	20	0	0.00												
EM02-3	20	20	0	0.00												
EM02-4	20	20	0	0.00												
Total:	80	80	0		0	0	0	0	0	0	0	0	0	0	0	0
Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 23, 5/31/2000, DAY 7

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	20	0	0.00												
EM01-2	20	18	0	0.00												
EM01-3	20	17	0	0.00												
EM01-4	20	17	0	0.00												
Total:	80	72	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):			Means:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	20	16	0	0.00												
EM02-2	20	18	0	0.00												
EM02-3	20	17	0	0.00												
EM02-4	20	19	0	0.00												
Total:	80	70	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):			Means:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

**HOUSATONIC RIVER PROJECT
CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
R3 EXTERNAL REFERENCE LARVAE IN REFERENCE SITE 40 (MP), 0.04 mg/Kg SEDIMENT PCB**

STAGE 25, 6/13/2000, DAY 20

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	20	0	0.00												
EM01-2	20	17	0	0.00												
EM01-3	20	17	0	0.00												
EM01-4	20	17	0	0.00												
Total:	80	71	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	20	15	0	0.00												
EM02-2	20	18	0	0.00												
EM02-3	20	17	0	0.00												
EM02-4	20	19	0	0.00												
Total:	80	69	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				na	na	na	na	na	na	na	na	na	na	na	na	na

STAGE 29, 7/5/2000, DAY 42

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	20	0	0.00												
EM01-2	20	16	0	0.00												
EM01-3	20	17	0	0.00												
EM01-4	20	16	1	5.00		1										
Total:	80	69	1		0	1	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				1.25	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	20	15	0	0.00												
EM02-2	20	18	0	0.00												
EM02-3	20	17	1	5.00		1	1									
EM02-4	20	18	0	0.00												
Total:	80	68	1		0	1	1	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				1.25	0.00	1.25	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				1.25	0.00	1.25	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				0.00	0.00	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				0.00	na	0.00	141.42	na	na	na	na	na	na	na	na	na

**HOUSATONIC RIVER PROJECT
CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000
STAGE/MALFORMATION DATA
R3 EXTERNAL REFERENCE LARVAE IN REFERENCE SITE 40 (MP), 0.04 mg/Kg SEDIMENT PCB**

STAGE 30, 7/11/2000, DAY 48

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	20	0	0.00												
EM01-2	20	16	1	5.00		1	1									
EM01-3	20	17	2	10.00		2	2									
EM01-4	20	16	0	0.00												
Total:	80	69	3		0	3	3	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				3.75	0.00	3.75	3.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	20	15	5	25.00		5	4		2			3		1		
EM02-2	20	18	5	25.00		5	5	3	4			5				
EM02-3	20	17	6	30.00		5	4	1	4			5		1		1
EM02-4	20	18	8	40.00		8	7	4	6	1		7		2		
Total:	80	68	24		0	23	20	8	16	1	0	20	0	4	0	1
Means (based on initial larval count):				30.00	0.00	28.75	25.00	10.00	20.00	1.25	0.00	25.00	0.00	5.00	0.00	1.25
Grand Means:				16.88	0.00	16.25	14.38	5.00	10.00	0.63	0.00	12.50	0.00	2.50	0.00	0.63
Var (S2)				344.53	0.00	312.50	225.78	50.00	200.00	0.78	0.00	312.50	0.00	12.50	0.00	0.78
SEM				13.13	0.00	12.50	10.63	5.00	10.00	0.63	0.00	12.50	0.00	2.50	0.00	0.63
CV (%)				109.99	na	108.79	104.53	141.42	141.42	141.42	na	141.42	na	141.42	na	141.42

STAGE 38, 8/8/2000, DAY 76

SAMPLE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
					EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
EM01-1	20	13	1	5.00		1										
EM01-2	20	15	1	5.00		1										
EM01-3	20	15	1	5.00		1			1							
EM01-4	20	16	1	5.00		1	1		1							
Total:	80	59	4		0	4	1	0	2	0	0	0	0	0	0	0
Means (based on initial larval count):				5.00	0.00	5.00	1.25	0.00	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EM02-1	20	15	0	0.00												
EM02-2	20	18	0	0.00												
EM02-3	20	16	0	0.00												
EM02-4	20	17	0	0.00												
Total:	80	66	0		0	0	0	0	0	0	0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Means:				2.50	0.00	2.50	0.63	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)				12.50	0.00	12.50	0.78	0.00	3.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM				2.50	0.00	2.50	0.63	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)				141.42	na	141.42	141.42	na	141.42	na	na	na	na	na	na	na

GRAND MEANS OF COMBINED LARVAL MALFORMATION DATA

	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)											
			EDEMA	TAIL	NOTOCHORD	FIN	FACE	BRAIN	EYE	MOUTH	GUT	HEMORRHAGE	CARDIAC	STUNTED
Grand Means:	3.44	0.00	0.00	3.33	2.60	0.83	1.88	0.10	0.00	2.08	0.00	0.42	0.00	0.10
SEM	2.35	0.00	2.26	2.04	2.04	0.72	1.42	0.09	0.00	1.80	0.00	0.36	0.00	0.09

**HOUSATONIC RIVER PROJECT
CROSSOVER *RANA pipiens* DEVELOPMENTAL STUDY 2000
GROWTH DATA SUMMARY**

R1 Ref Larvae in Site W-8 (120.0 mg/kg Sed PCB) Reps=4, 91 Days*			
STUDY DAY	DEVELOPMENTAL STAGE	MEAN GROWTH (cm)	SEM
0	20	1.216	0.023
10	22	1.858	0.014
17	23	2.021	0.066
22	23	1.901	0.031
35	24	2.570	0.058
57	24	3.758	0.129
63	28	4.034	0.115
91	28	4.059	0.128

R3 Ref Larvae in Site W-8 (120.0 mg/kg Sed PCB) Reps=4, 76 Days*			
STUDY DAY	DEVELOPMENTAL STAGE	MEAN GROWTH (cm)	SEM
0	20	1.029	0.004
7	21	1.497	0.031
20	24	2.420	0.024
42	25	3.710	0.088
48	27	3.884	0.123
76	32	4.397	0.025

REFERENCE SITE DATA SHARED WITH DEVELOPMENTAL STUDY R3 LARVAE IN SITE 40 WATER/SEDIMENT			
R3 Ref Larvae in Ref Site MP (0.04 mg/kg Sed PCB) Reps=8, 76 Days*			
STUDY DAY	DEVELOPMENTAL STAGE	MEAN GROWTH (cm)	SEM
0	20	1.018	0.010
7	23	1.488	0.022
20	25	2.311	0.073
42	29	3.579	0.028
48	30	3.803	0.029
76	38	4.383	0.048

*Test Duration.

**HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R1 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB**

	EM01-1	EM01-2	EM01-3	EM01-4
	1.301	1.301	1.120	1.286
DATE	1.226	1.183	1.165	1.233
05/09/00	1.149	1.333	1.239	1.257
	1.120	1.382	1.120	1.392
STUDY DAY	1.201	1.213	1.253	1.276
0	1.339	1.268	1.157	1.156
	1.171	1.095	1.081	1.321
STAGE	1.200	1.174	1.200	1.229
20	1.284	1.088	1.114	1.215
	1.099	1.171		1.380

Individual Statistics

N	10	10	9	10
Mean	1.209	1.221	1.161	1.275
Var. (S²)	0.006	0.010	0.004	0.005
SEM	0.025	0.031	0.020	0.023

Site Average

Total N	39
Site Mean	1.216
Var. (S²)	0.002
SEM	0.023

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R1 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB

	EM01-1	EM01-2	EM01-3	EM01-4
	1.958	1.625	1.810	1.730
DATE	2.194	1.488	1.920	2.162
05/19/00	1.829	1.676	2.022	1.979
	1.538	1.851	1.986	1.730
STUDY DAY	1.675	1.636	1.940	1.760
10	1.996	1.874	1.942	1.651
	1.984	1.963	1.446	1.913
STAGE	1.640	1.879	1.899	1.944
22	1.721	1.691	2.036	1.754
	2.042	2.547		2.004

Individual Statistics

N	10	10	9	10
Mean	1.858	1.823	1.889	1.863
Var. (S^2)	0.044	0.086	0.032	0.026
SEM	0.066	0.093	0.060	0.051

Site Average

Total N	39
Site Mean	1.858
Var. (S^2)	0.001
SEM	0.014

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R1 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB

	EM01-1	EM01-2	EM01-3	EM01-4
	1.815	2.129	2.018	2.005
DATE	2.162	2.077	2.115	2.138
05/26/00	2.341	2.018	1.855	2.015
	2.137	1.972	1.959	2.045
STUDY DAY	2.144	2.519	1.545	1.708
17	2.044	2.176	1.844	2.335
	2.463	1.727	1.701	2.140
STAGE	2.241	1.863		1.895
23	2.099	2.014		2.023
	2.386	1.887		1.694

Individual Statistics

N	10	10	7	10
Mean	2.183	2.038	1.862	2.000
Var. (S ²)	0.035	0.046	0.037	0.038
SEM	0.059	0.068	0.073	0.062

Site Average

Total N	37
Site Mean	2.021
Var. (S ²)	0.017
SEM	0.066

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R1 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB

	EM01-1	EM01-2	EM01-3	EM01-4
	2.033	2.129	2.098	1.903
DATE	2.118	1.841	1.857	1.674
05/31/00	1.608	1.905	2.062	1.938
	1.984	1.831	1.953	1.813
STUDY DAY	1.946	1.778	1.964	1.664
22	1.688	1.703		2.311
	1.840	1.935		1.757
STAGE	1.523	2.151		1.954
23	1.840	1.945		1.779
	1.890	1.831		

Individual Statistics

N	10	10	5	9
Mean	1.847	1.905	1.987	1.866
Var. (S^2)	0.036	0.021	0.009	0.039
SEM	0.060	0.045	0.043	0.066

Site Average

Total N	34
Site Mean	1.901
Var. (S^2)	0.004
SEM	0.031

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R1 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB

	EM01-1	EM01-2	EM01-3	EM01-4
	2.570	1.842	2.392	2.481
DATE	2.392	2.272	2.322	2.534
06/13/00	2.627	2.852	3.324	2.444
	3.288	2.281	2.799	2.403
STUDY DAY	2.400	2.514	2.810	2.358
35	2.012	2.615		3.284
	2.384	2.629		2.511
STAGE		2.631		
24				

Individual Statistics

N	7	8	5	7
Mean	2.525	2.455	2.729	2.574
Var. (S^2)	0.152	0.098	0.161	0.102
SEM	0.147	0.111	0.180	0.121

Site Average

Total N	27
Site Mean	2.570
Var. (S^2)	0.014
SEM	0.058

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R1 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB

	EM01-1	EM01-2	EM01-3	EM01-4
	4.040	4.284	3.843	5.530
DATE	3.679	4.500	3.345	2.730
07/05/00	3.551	3.260	5.089	4.114
	3.209	3.627	4.369	3.091
STUDY DAY	2.521	3.168	3.386	5.015
57	3.418	3.816		3.231
	3.382	4.306		2.663
STAGE		3.895		
24				

Individual Statistics

N	7	8	5	7
Mean	3.400	3.857	4.006	3.768
Var. (S²)	0.220	0.240	0.538	1.304
SEM	0.177	0.173	0.328	0.432

Site Average

Total N	27
Site Mean	3.758
Var. (S²)	0.067
SEM	0.129

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R1 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB

	EM01-1	EM01-2	EM01-3	EM01-4
	3.885	4.245	3.667	6.348
DATE	3.890	3.965	4.528	2.802
07/11/00	3.312	3.948	3.825	3.010
	3.337	3.972	5.043	4.740
STUDY DAY	3.485	3.901	4.533	3.261
63	4.176	4.900		5.140
	4.300	3.767		3.316
STAGE		2.967		
28				

Individual Statistics

N	7	8	5	7
Mean	3.769	3.958	4.319	4.088
Var. (S²)	0.158	0.285	0.321	1.789
SEM	0.150	0.189	0.253	0.506

Site Average

Total N	27
Site Mean	4.034
Var. (S²)	0.053
SEM	0.115

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R1 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB

	EM01-1	EM01-2	EM01-3	EM01-4
	4.043	3.706	4.295	5.684
DATE	3.289	3.681	3.873	4.041
08/08/00	5.283	5.189	4.434	4.362
	3.610	4.510	2.414	3.430
STUDY DAY		3.453		
91		3.449		
		4.331		
STAGE				
28				

Individual Statistics

N	4	7	4	4
Mean	4.056	4.045	3.754	4.379
Var. (S^2)	0.764	0.427	0.855	0.906
SEM	0.437	0.247	0.462	0.476

Site Average

Total N	19
Site Mean	4.059
Var. (S^2)	0.065
SEM	0.128

**HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R3 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB**

	EM01-1	EM01-2	EM01-3	EM01-4
	1.134	0.950	1.118	1.206
DATE	1.142	1.025	0.901	1.014
05/24/00	1.048	1.084	0.886	1.156
	1.041	1.034	1.145	0.900
STUDY DAY	0.833	1.083	1.003	1.000
0	0.756	1.050	1.072	0.974
	0.923	1.021	1.072	1.175
STAGE	1.101	1.028	0.925	1.171
20	1.010	0.865	1.052	1.085
	1.116	1.014	1.011	1.063
	0.993	1.025	1.033	1.106
	1.106	0.956	0.946	1.073
	1.082	0.958	1.291	1.020
	1.059	1.024	1.010	1.059
	1.061	1.117	1.031	0.932
	1.081	1.091	0.958	0.983
	1.019	1.043	1.058	1.019
	1.011	1.054	1.065	0.895
	0.963	0.982	0.982	0.920
	1.087	0.973	1.017	1.028

Individual Statistics

N	20	20	20	20
Mean	1.028	1.019	1.029	1.039
Var. (S ²)	0.010	0.003	0.008	0.009
SEM	0.022	0.013	0.021	0.021

Site Average

Total N	80
Site Mean	1.029
Var. (S ²)	0.000
SEM	0.004

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R3 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB

	EM01-1	EM01-2	EM01-3	EM01-4
	1.418	1.426	1.572	1.468
DATE	1.460	1.667	1.589	1.521
05/31/00	1.496	1.671	1.490	1.639
	1.471	1.634	1.428	1.471
STUDY DAY	0.989	1.461	1.553	1.462
7	1.484	1.492	1.578	1.521
	1.401	1.393	1.380	1.683
STAGE	1.284	1.667	1.385	1.705
21	1.475	1.655	1.468	0.138
	1.360	1.395	1.567	1.624
	1.395	1.594	1.675	1.514
	1.559	1.581	1.463	1.487
	1.341	1.701	1.460	1.580
	1.429	1.542	1.360	1.598
	1.351	1.393	1.502	1.631
	1.522	1.710	1.583	1.405
	1.527	1.602	1.679	1.384
	1.501	1.589	1.786	1.639
	1.528			1.462
	1.528			

Individual Statistics

N	20	18	18	19
Mean	1.426	1.565	1.529	1.470
Var. (S^2)	0.016	0.012	0.013	0.113
SEM	0.028	0.026	0.027	0.077

Site Average

Total N	75
Site Mean	1.497
Var. (S^2)	0.004
SEM	0.031

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R3 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB

	EM01-1	EM01-2	EM01-3	EM01-4
	2.413	2.970	2.534	2.962
DATE	2.888	2.419	2.159	2.818
06/13/00	2.839	2.629	2.379	2.136
	2.261	2.678	2.595	2.252
STUDY DAY	2.206	2.758	2.495	2.350
20	2.648	2.454	2.223	2.617
	2.314	2.455	2.199	2.190
STAGE	2.011	2.105	2.167	2.696
24	2.383	2.584	2.606	2.303
	2.452	2.255	2.251	2.629
	2.689	2.017	2.633	2.674
	2.678	2.389	2.619	2.367
	2.622	2.735	2.206	2.176
	2.601	2.296	2.212	2.393
	2.317	2.270	2.012	2.387
	2.307	2.089	2.456	2.414
	2.457	2.097	2.617	2.375
		2.180	2.091	2.001
				2.526

Individual Statistics

N	17	18	18	19
Mean	2.476	2.410	2.359	2.435
Var. (S ²)	0.055	0.074	0.044	0.061
SEM	0.057	0.064	0.050	0.057

Site Average

Total N	72
Site Mean	2.420
Var. (S ²)	0.002
SEM	0.024

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R3 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB

	EM01-1	EM01-2	EM01-3	EM01-4
	2.901	4.298	3.177	3.693
DATE	3.844	4.861	3.569	3.544
07/05/00	3.598	4.275	3.569	3.995
	3.626	3.630	3.978	4.499
STUDY DAY	3.661	3.959	3.716	3.618
42	4.179	4.789	3.584	3.159
	3.491	3.370	3.419	2.995
STAGE	3.974	3.352	3.503	3.909
25	4.017	3.579	3.943	3.297
	4.211	3.563	3.548	3.436
	3.827	4.174	3.851	4.284
	3.122	3.673	3.850	3.817
	4.003	3.498	4.011	3.147
	3.889	4.149	3.689	3.790
	3.798	3.836	3.727	3.659
	3.486	4.461	3.767	3.788
		3.634	3.060	2.855
			3.250	3.138
				2.679

Individual Statistics

N	16	17	18	19
Mean	3.727	3.947	3.623	3.542
Var. (S ²)	0.127	0.224	0.074	0.228
SEM	0.089	0.115	0.064	0.109

Site Average

Total N	70
Site Mean	3.710
Var. (S ²)	0.031
SEM	0.088

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R3 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB

	EM01-1	EM01-2	EM01-3	EM01-4
	3.787	4.711	3.937	3.816
DATE	4.749	4.210	4.047	4.159
07/11/00	3.715	3.837	4.621	4.523
	3.389	3.754	3.434	4.176
STUDY DAY	4.779	4.544	3.136	3.091
48	4.087	4.263	3.750	3.771
	3.900	4.167	3.619	3.827
STAGE	4.503	4.271	3.630	4.437
27	4.129	3.688	3.849	3.138
	4.993	3.369	3.542	3.188
	4.135	3.686	4.023	4.030
	4.066	3.668	3.452	3.508
	4.059	4.227	3.740	3.151
	4.129	3.387	3.989	3.858
	4.123	4.868	4.152	3.780
	3.622	4.048	3.773	3.292
		4.070	3.452	3.074
			3.250	3.138
				2.679

Individual Statistics

N	16	17	18	19
Mean	4.135	4.045	3.744	3.612
Var. (S ²)	0.190	0.185	0.127	0.272
SEM	0.109	0.104	0.084	0.120

Site Average

Total N	70
Site Mean	3.884
Var. (S ²)	0.061
SEM	0.123

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R3 REF. LARVAE IN SITE 33 (W-8), 120.0 mg/kg Sed. PCB

	EM01-1	EM01-2	EM01-3	EM01-4
	3.001	4.850	4.265	4.658
DATE	4.564	5.526	4.048	5.604
08/08/00	4.186	4.323	4.337	4.835
	5.179	4.250	4.095	3.820
STUDY DAY	4.073	4.587	5.622	4.376
76	4.428	4.697	5.071	4.409
	4.782	5.159	3.452	4.981
STAGE	4.893	3.616	3.774	3.776
32	4.191	4.344	4.871	5.625
	4.702	4.392	4.715	4.688
	5.356	3.720	4.205	5.059
	3.936	3.873	3.613	3.269
	5.217	4.456	4.075	4.899
	3.052	5.399	4.695	3.965
	2.875	4.800	4.977	4.393
	5.504	3.130	4.134	3.808
		4.842	3.807	4.072
			4.649	3.806
				3.410

Individual Statistics

N	16	17	18	19
Mean	4.371	4.469	4.356	4.392
Var. (S ²)	0.694	0.403	0.319	0.461
SEM	0.208	0.154	0.133	0.156

Site Average

Total N	70
Site Mean	4.397
Var. (S ²)	0.003
SEM	0.025

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R3 (External Reference) LARVAE IN REFERENCE SITE 40 (MP) (0.04 mg/kg Sediment PCB Concentration)
(Larvae maintained in FETAX solution until Site MP water was received on May 30, 2000)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	1.061	1.102	1.058	1.031	1.003	1.163	1.206	1.099
DATE	1.003	0.982	1.046	0.911	1.048	1.041	1.089	0.937
05/24/00	0.957	0.934	0.959	1.006	0.982	0.955	1.116	0.888
	1.041	1.007	1.170	0.669	0.945	1.101	1.102	1.037
STUDY DAY	0.896	0.934	1.061	0.972	0.967	1.058	1.187	1.011
0	1.002	1.028	1.111	1.007	1.019	1.050	1.024	1.025
	1.118	1.038	1.069	0.959	0.928	0.923	1.033	1.047
STAGE	0.832	0.982	1.139	0.917	1.047	1.047	1.046	0.872
20	0.950	0.979	1.093	0.982	1.040	0.845	0.834	1.006
	1.007	1.034	0.923	0.950	1.159	0.982	1.019	1.025
	0.986	0.958	1.010	0.944	1.072	0.925	1.033	0.943
	1.133	0.780	1.028	1.072	1.007	1.037	0.970	1.080
	1.002	1.096	1.021	1.081	1.046	1.117	1.022	0.865
	1.047	0.996	1.072	1.093	1.031	1.010	0.917	1.061
	0.937	0.806	1.011	1.096	1.047	1.195	0.923	0.972
	1.131	0.862	1.131	1.014	1.117	1.125	1.112	1.065
	1.093	1.059	1.007	1.028	1.010	0.982	0.959	0.979
	1.193	1.044	1.041	1.033	1.011	1.022	1.024	1.308
	1.087	0.972	1.155	0.985	1.031	1.140	1.046	1.028
	1.096	0.907	0.727	0.975	1.028	1.072	0.976	1.080
Individual Statistics								
N	20	20	20	20	20	20	20	20
Mean	1.029	0.975	1.042	0.986	1.027	1.039	1.032	1.016
Var. (S ²)	0.008	0.007	0.009	0.009	0.003	0.008	0.008	0.010
SEM	0.020	0.019	0.022	0.021	0.012	0.020	0.020	0.022
EM01 Average				EM02 Average				
Total N	80				Total N	80		
Site Mean	1.008				Site Mean	1.029		
Var. (S ²)	0.001				Var. (S ²)	0.000		
SEM	0.016				SEM	0.005		
Site Average								
Total N	160							
Site Mean	1.018							
Var. (S ²)	0.000							
SEM	0.010							

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R3 (External Reference) LARVAE IN REFERENCE SITE 40 (MP) (0.04 mg/kg Sediment PCB Concentration)
(Larvae maintained in FETAX solution until Site MP water was received on May 30, 2000)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	1.247	1.478	1.514	1.621	2.140	1.399	1.605	1.556
DATE	1.354	1.438	1.328	1.258	1.735	1.373	1.529	1.468
05/31/00	1.185	1.436	1.489	1.363	1.690	1.380	1.575	1.486
	1.504	1.270	1.538	1.457	1.351	1.463	1.525	1.382
STUDY DAY	1.634	1.439	1.533	1.542	1.540	1.418	1.553	1.350
7	1.735	1.595	1.643	1.351	1.501	1.468	1.547	1.538
	1.866	1.456	1.675	1.379	1.488	1.360	1.586	1.645
STAGE	1.189	1.659	1.521	1.664	1.486	1.281	1.616	1.612
23	1.095	1.548	1.621	1.721	1.856	1.358	1.522	1.462
	1.378	1.496	1.646	1.581	1.496	1.389	1.693	1.607
	1.282	1.368	1.420	1.621	1.455	1.410	1.370	1.368
	1.515	1.325	1.247	1.547	1.517	1.537	1.595	1.190
	1.393	1.344	1.451	1.581	1.470	1.596	1.462	1.559
	1.351	1.522	1.498	1.498	1.622	1.373	1.546	1.547
	1.382	1.460	1.364	1.486	1.384	1.357	1.746	1.635
	1.337	1.372	1.506	1.701	1.585	1.330	1.245	1.525
	1.448	1.325	1.304	1.572		1.582	1.542	1.521
	1.475	1.154				1.422		1.594
	1.525							1.404
	1.529							

Individual Statistics								
N	20	18	17	17	16	18	17	19
Mean	1.421	1.427	1.488	1.526	1.582	1.416	1.545	1.497
Var. (S ²)	0.035	0.015	0.015	0.017	0.039	0.007	0.013	0.014
SEM	0.042	0.029	0.030	0.032	0.049	0.020	0.027	0.027
EM01 Average			EM02 Average					
Total N	72			Total N	70			
Site Mean	1.466			Site Mean	1.510			
Var. (S ²)	0.003			Var. (S ²)	0.005			
SEM	0.025			SEM	0.036			
Site Average								
Total N	142							
Site Mean	1.488							
Var. (S ²)	0.001							
SEM	0.022							

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R3 (External Reference) LARVAE IN REFERENCE SITE 40 (MP) (0.04 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	1.869	2.356	2.414	2.327	2.361	2.351	2.205	2.502
DATE	2.113	2.038	2.671	2.274	2.636	2.283	2.791	2.594
06/13/00	2.274	2.381	2.197	2.165	2.501	2.613	2.712	2.655
	2.100	2.186	2.371	2.287	2.660	2.472	2.812	3.117
STUDY DAY	2.227	2.360	2.404	2.469	2.542	2.434	2.509	2.400
20	2.287	2.339	2.954	2.670	2.517	2.735	2.192	2.347
	2.110	2.388	1.868	2.098	2.465	1.972	2.563	2.450
STAGE	2.238	1.996	2.142	2.367	2.659	2.238	2.450	2.222
25	2.215	1.998	1.823	2.194	2.360	2.256	2.297	2.182
	1.946	2.164	2.131	2.447	2.523	2.271	2.346	2.295
	2.290	2.246	2.186	2.367	2.232	2.555	2.492	2.212
	2.224	2.556	2.307	2.490	2.332	2.232	2.656	2.277
	1.980	2.408	2.351	1.968	2.596	2.367	2.550	2.133
	2.028	2.280	2.361	2.198	2.637	2.038	1.847	2.227
	2.150	2.239	2.384	1.674	2.592	2.153	1.913	1.946
	1.960	2.194	2.366	2.182		2.153	2.405	1.984
	1.864	2.473	2.014	2.257		2.612	2.273	2.053
	2.134					2.074		1.782
	2.112							2.200
	2.473							

Individual Statistics

N	20	17	17	17	15	18	17	19
Mean	2.130	2.271	2.291	2.261	2.507	2.323	2.413	2.294
Var. (S ²)	0.024	0.026	0.074	0.050	0.018	0.046	0.075	0.088
SEM	0.035	0.039	0.066	0.054	0.034	0.050	0.067	0.068

EM01 Average

Total N	71
Site Mean	2.238
Var. (S ²)	0.005
SEM	0.037

EM02 Average

Total N	69
Site Mean	2.384
Var. (S ²)	0.009
SEM	0.048

Site Average

Total N	140
Site Mean	2.311
Var. (S ²)	0.011
SEM	0.073

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R3 (External Reference) LARVAE IN REFERENCE SITE 40 (MP) (0.04 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	3.920	3.273	3.207	5.102	2.818	3.427	3.048	3.489
DATE	3.189	4.271	3.148	3.373	2.982	3.887	3.218	3.224
07/05/00	4.199	3.393	2.812	3.349	3.699	3.976	2.879	3.248
	3.441	2.772	4.583	2.836	3.578	3.800	3.940	3.672
STUDY DAY	4.251	3.329	3.588	2.966	3.887	4.402	3.931	4.791
42	3.002	3.837	3.183	3.349	2.478	4.186	3.275	3.666
	3.670	4.664	3.645	3.950	3.021	4.081	3.866	3.513
STAGE	3.727	3.689	2.502	2.989	4.098	3.401	4.482	3.328
29	3.193	5.386	3.662	2.739	2.929	4.786	4.159	3.670
	4.274	3.573	2.905	2.736	2.488	3.658	4.526	3.949
	3.630	3.532	2.845	2.841	3.501	3.967	3.808	3.334
	2.516	3.373	3.687	3.587	2.950	3.541	3.586	3.974
	4.647	3.423	3.884	3.594	3.299	4.447	4.898	3.506
	3.607	4.237	2.752	3.942	3.643	3.351	4.548	4.343
	3.163	3.374	4.946	3.468	3.692	3.132	2.286	2.887
	4.796	3.010	3.130	4.196		3.550	3.395	2.904
	3.701		3.298			3.613	3.599	3.126
	3.409					4.362		3.412
	3.432							
	3.664							

Individual Statistics								
N	20	16	17	16	15	18	17	18
Mean	3.671	3.696	3.399	3.439	3.271	3.865	3.732	3.558
Var. (S ²)	0.313	0.433	0.414	0.403	0.252	0.201	0.464	0.230
SEM	0.125	0.164	0.156	0.159	0.130	0.106	0.165	0.113
EM01 Average								
Total N	69							
Site Mean	3.551							
Var. (S ²)	0.024							
SEM	0.077							
EM02 Average								
Total N					68			
Site Mean					3.606			
Var. (S ²)					0.066			
SEM					0.128			
Site Average								
Total N	137							
Site Mean	3.579							
Var. (S ²)	0.002							
SEM	0.028							

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R3 (External Reference) LARVAE IN REFERENCE SITE 40 (MP) (0.04 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	3.324	4.054	2.979	3.792	3.890	5.081	4.285	5.115
DATE	4.023	3.799	3.620	3.467	3.872	3.727	2.755	3.863
07/11/00	3.964	3.261	3.393	5.739	3.638	4.018	3.886	3.853
	3.116	3.359	3.691	3.473	4.373	4.079	3.585	3.487
STUDY DAY	4.295	3.266	5.058	3.413	3.259	3.523	2.760	3.819
48	4.386	3.855	4.501	3.484	3.362	3.961	4.641	3.769
	3.764	3.233	3.053	3.347	3.567	3.701	3.909	3.812
STAGE	4.509	4.204	3.179	3.228	3.028	3.675	4.713	3.447
30	3.732	3.981	3.235	3.675	2.299	4.748	3.886	3.357
	3.157	5.218	3.913	3.258	3.692	3.952	4.685	4.045
	3.054	3.701	3.519	3.239	3.306	3.902	4.025	4.276
	3.132	3.250	3.570	3.767	3.668	3.814	4.217	2.984
	4.747	3.947	3.805	3.705	4.439	3.635	5.647	3.490
	3.753	3.788	4.391	4.345	3.808	3.938	3.943	5.165
	3.525	5.674	2.833	3.949	3.658	4.363	2.264	3.862
	3.559	3.628	3.285	3.826		3.663	3.543	3.260
	4.802		3.836			4.181	4.132	3.684
	5.167					3.575		3.658
	3.314							
	3.362							

Individual Statistics

N	20	16	17	16	15	18	17	18
Mean	3.834	3.889	3.639	3.732	3.591	3.974	3.934	3.830
Var. (S ²)	0.400	0.475	0.342	0.376	0.271	0.168	0.669	0.317
SEM	0.141	0.172	0.142	0.153	0.135	0.097	0.198	0.133

EM01 Average

Total N	69
Site Mean	3.773
Var. (S ²)	0.012
SEM	0.055

EM02 Average

Total N	68
Site Mean	3.832
Var. (S ²)	0.030
SEM	0.086

Site Average

Total N	137
Site Mean	3.803
Var. (S ²)	0.002
SEM	0.029

HOUSATONIC RIVER PROJECT
CROSSOVER RANA pipiens DEVELOPMENTAL STUDY 2000
GROWTH DATA (Length in cm)
R3 (External Reference) LARVAE IN REFERENCE SITE 40 (MP) (0.04 mg/kg Sediment PCB Concentration)

	EM01-1	EM01-2	EM01-3	EM01-4	EM02-1	EM02-2	EM02-3	EM02-4
	4.749	4.107	5.539	4.061	3.815	4.173	4.502	4.932
DATE	3.323	5.180	3.440	4.210	3.682	3.831	5.523	4.986
08/08/00	3.052	4.687	3.657	4.109	4.326	4.644	4.233	5.690
	4.007	4.742	4.868	5.411	3.246	4.672	2.739	3.775
STUDY DAY	5.520	4.600	4.043	3.673	3.583	5.941	4.343	3.208
76	5.334	4.324	3.736	4.493	3.385	4.025	5.068	4.293
	4.297	4.055	4.657	4.102	4.772	4.683	5.171	3.783
STAGE	5.273	5.301	3.286	3.058	5.046	3.881	6.426	4.327
38	3.311	3.263	4.528	3.179	4.142	4.214	5.343	4.028
	5.034	5.186	4.135	3.761	4.074	4.517	4.028	4.217
	3.832	6.018	3.840	3.129	3.608	3.728	3.370	4.278
	4.638	3.823	4.940	3.687	2.859	5.727	4.102	4.072
	4.327	4.786	3.887	3.695	3.240	2.836	4.041	3.595
		4.510	3.645	5.280	3.245	4.672	4.125	4.862
		5.055	5.471	5.081	3.836	4.350	5.656	4.989
				4.541		4.298	5.277	3.773
						4.102		4.517
						4.124		

Individual Statistics

N	13	15	15	16	15	18	16	17
Mean	4.361	4.642	4.245	4.092	na	4.357	4.622	4.313
Var. (S ²)	0.676	0.460	0.512	0.530	0.361	0.488	0.876	0.393
SEM	0.228	0.175	0.185	0.182	0.155	0.165	0.234	0.152

EM01 Average

Total N	59
Site Mean	4.335
Var. (S ²)	0.054
SEM	0.116

EM02 Average

Total N	66
Site Mean	4.430
Var. (S ²)	0.028
SEM	0.096

Site Average

Total N	125
Site Mean	4.383
Var. (S ²)	0.005
SEM	0.048

Appendix E

Amphibian Crossover Study - Survival on Day 106

Start Date:	Test ID:	Sample ID:	Crossover
End Date:	Lab ID:	Sample Type:	PCB sediments
Sample Date:	Protocol:	Test Species:	<i>Rana Pipiens</i>
Comments: Leopard frog - Crossover Study; using only R3 EM01 data			

Conc-mg/Kg	1	2	3	4
MP (0.04)	0.4000	0.7500	0.4000	0.6500
W8 (120)	0.6000	0.6500	0.6500	0.8000

Conc-mg/Kg	Mean	SD	Transform: Arcsin Square Root					t-Stat	1-Tailed	
			Mean	Min	Max	CV%	N		Critical	MSD
MP	0.5500	0.1780	0.8386	0.6847	1.0472	21.848	4			
W8	0.6750	0.0866	0.9672	0.8861	1.1071	9.971	4	-1.242	1.943	0.2012

Auxiliary Tests	Statistic	Critical	Skew	Kurt		
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.918895	0.749	0.376561	-1.30401		
F-Test indicates equal variances (p = 0.32)	3.609126	47.46835				
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.198912	0.359634	0.033067	0.021434	0.260552	1, 6

Due to possible confounding sources of variation (egg source, egg mass, laboratory setup/handling), data for R1 EM01(120 m/kg PCB) and R3 EM02 (0.04 mg/kg PCB) were not included in the crossover analysis

Appendix E

Amphibian Crossover Study - Average # malformation observed over 76 days					
Start Date:		Test ID:		Sample ID:	Crossover
End Date:		Lab ID:		Sample Type:	PCB sediments
Sample Date:		Protocol:		Test Species:	<i>Rana Pipiens</i>
Comments:		Leopard frog - Crossover Study; average # malformations observed over 76 days not including mortality as a malformation			
Conc.-%	1	2	3	4	
W8	5.0000	4.8000	4.4000	4.8000	
MP	0.2000	0.4000	0.6000	0.4000	

Conc-%	Mean	SD	Transform: Untransformed				N	t-Stat	1-Tailed	
			Mean	Min	Max	CV%			Critical	MSD
W8	4.7500	0.2517	4.7500	4.4000	5.0000	5.298	4			
*MP	0.4000	0.1633	0.4000	0.2000	0.6000	40.825	4	29.000	1.943	0.2915

Auxiliary Tests	Statistic		Critical	Skew	Kurt	
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.930376		0.749	-0.6789	0.198765	
F-Test indicates equal variances (p = 0.50)	2.375		47.46835			
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences	0.291477	0.061364	37.845	0.045	1.1E-07	1, 6

FEL to comment on appropriateness of analysis at 76 days.

This time period was selected for analysis because it enabled comparison of the two treatment groups at the same point in time (observation day).

Appendix E

Amphibian Crossover Study - Length on Day 69/ # surviving larvae on Day 6:			
Start Date:	Test ID:	Sample ID:	Crossover
End Date:	Lab ID:	Sample Type:	PCB sediments
Sample Date:	Protocol:	Test Species:	<i>Rana Pipiens</i>
Comments: Leopard frog - Crossover Study; using only R3 EM01 data; length/surviving larvae			

Conc-mg/Kg	1	2	3	4
MP	0.3355	0.3095	0.2830	0.2558
W8	0.2732	0.2629	0.2420	0.2312

Conc-mg/Kg	Mean	SD	Transform: Untransformed					t-Stat	1-Tailed	
			Mean	Min	Max	CV%	N		Critical	MSD
MP	0.2959	0.0343	0.2959	0.2558	0.3355	11.588	4			
*W8	0.2523	0.0192	0.2523	0.2312	0.2732	7.594	4	2.221	1.943	0.0382

Auxiliary Tests	Statistic	Critical	Skew	Kurt		
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.979174	0.749	-0.03281	-0.56897		
F-Test indicates equal variances (p = 0.36)	3.202972	47.46835				
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences	0.038165	0.12897	0.003804	0.000771	0.068146	1, 6

Appendix E

Amphibian Crossover Study - Metamorphosis on Day 10

Start Date:	Test ID:	Sample ID:	Crossover
End Date:	Lab ID:	Sample Type:	PCB sediments
Sample Date:	Protocol:	Test Species:	<i>Rana Pipiens</i>
Comments: Leopard frog - Crossover Study; using only R3 EM01 data; # metamorph/# seeded			

Conc-mg/Kg	1	2	3	4
MP	0.0000	0.1000	0.0500	0.0000
W8	0.1000	0.1000	0.0500	0.1000

Conc-mg/Kg	Mean	SD	Transform: Arcsin Square Root					t-Stat	1-Tailed Critical	MSD
			Mean	Min	Max	CV%	N			
MP	0.0375	0.0479	0.1928	0.1120	0.3218	52.497	4			
W8	0.0875	0.0250	0.2977	0.2255	0.3218	16.164	4	-1.871	1.943	0.1089

Auxiliary Tests	Statistic	Critical	Skew	Kurt		
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.855798	0.749	0.380017	-0.27907		
F-Test indicates equal variances (p = 0.25)	4.425954	47.46835				
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.029698	0.808633	0.02199	0.006282	0.110525	1, 6

Due to possible confounding sources of variation (egg source, egg mass, laboratory setup/handling), data for R1 EM01(120 mg/kg PCB) and R3 EM02 (0.04 mg/kg PCB) were not included in the crossover analysis

Spike Study

Raw Data:
Mortality
Malformations
Hypothesis Testing Tables

HOUSATONIC RIVER PROJECT
SPIKE *RANA pipiens* DEVELOPMENTAL STUDY 2000 MORTALITY DATA
R4 EXTERNAL REFERENCE LARVAE IN SITE 40 (MP) WATER/SEDIMENT (SPIKED WITH 30.0 mg/Kg AROCLOR 1260)

R4 Ref Larvae in Ref Site MP (Spiked with 30.0 mg/Kg Aroclor 1260), 23 Days*

*Test Duration

DATE	DAY	REPLICATE 1				REPLICATE 2				REPLICATE 3				REPLICATE 4				REPLICATE 5			
		NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD
10/30/2000	0	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00
11/1/2000	2	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00
11/2/2000	3	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00
11/3/2000	4	1	1	9	10.00	1	1	9	10.00	1	1	9	10.00	2	2	8	20.00	0	0	10	0.00
11/6/2000	7	0	1	9	10.00	0	1	9	10.00	0	1	9	10.00	0	2	8	20.00	1	1	9	10.00
11/7/2000	8	0	1	9	10.00	0	1	9	10.00	0	1	9	10.00	0	2	8	20.00	0	1	9	10.00
11/13/2000	14	0	1	9	10.00	0	1	9	10.00	0	1	9	10.00	0	2	8	20.00	0	1	9	10.00
11/14/2000	15	0	1	9	10.00	0	1	9	10.00	0	1	9	10.00	0	2	8	20.00	0	1	9	10.00
11/15/2000	16	0	1	9	10.00	0	1	9	10.00	0	1	9	10.00	1	3	7	30.00	0	1	9	10.00
11/16/2000	17	0	1	9	10.00	0	1	9	10.00	0	1	9	10.00	0	3	7	30.00	0	1	9	10.00
11/17/2000	18	0	1	9	10.00	1	2	8	20.00	0	1	9	10.00	1	4	6	40.00	0	1	9	10.00
11/20/2000	21	0	1	9	10.00	2	4	6	40.00	0	1	9	10.00	6	10	0	100.00	0	1	9	10.00
11/21/2000	22	0	1	9	10.00	1	5	5	50.00	0	1	9	10.00	0	10	0	100.00	0	1	9	10.00
11/22/2000	23	0	1	9	10.00	0	5	5	50.00	0	1	9	10.00	0	10	0	100.00	0	1	9	10.00

DATE	DAY	REPLICATE 6				REPLICATE 7				REPLICATE 8				CUMULATIVE MORTALITY STATISTICS			
		NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	MEAN %	VAR (S2)	SEM	CV (%)
10/30/2000	0	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0.00	0.00	0.00	na
11/1/2000	2	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0.00	0.00	0.00	na
11/2/2000	3	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0.00	0.00	0.00	na
11/3/2000	4	1	1	9	10.00	1	1	9	10.00	0	0	10	0.00	8.75	41.07	2.27	73.24
11/6/2000	7	0	1	9	10.00	0	1	9	10.00	0	0	10	0.00	10.00	28.57	1.89	53.45
11/7/2000	8	0	1	9	10.00	0	1	9	10.00	0	0	10	0.00	10.00	28.57	1.89	53.45
11/13/2000	14	0	1	9	10.00	0	1	9	10.00	0	0	10	0.00	10.00	28.57	1.89	53.45
11/14/2000	15	0	1	9	10.00	0	1	9	10.00	0	0	10	0.00	10.00	28.57	1.89	53.45
11/15/2000	16	0	1	9	10.00	0	1	9	10.00	0	0	10	0.00	11.25	69.64	2.95	74.18
11/16/2000	17	0	1	9	10.00	0	1	9	10.00	0	0	10	0.00	11.25	69.64	2.95	74.18
11/17/2000	18	0	1	9	10.00	0	1	9	10.00	1	1	9	10.00	15.00	114.29	3.78	71.27
11/20/2000	21	0	1	9	10.00	0	1	9	10.00	2	3	7	30.00	27.50	992.86	11.14	114.58
11/21/2000	22	0	1	9	10.00	0	1	9	10.00	0	3	7	30.00	28.75	1041.07	11.41	112.23
11/22/2000	23	0	1	9	10.00	0	1	9	10.00	0	3	7	30.00	28.75	1041.07	11.41	112.23

HOUSATONIC RIVER PROJECT
SPIKE *RANA pipiens* DEVELOPMENTAL STUDY 2000 MORTALITY DATA
R4 EXTERNAL REFERENCE LARVAE IN SITE 40 (MP) WATER/SEDIMENT (UNSPIKED)

R4 Ref Larvae in Ref Site MP Unspiked (0.04 mg/Kg Sed PCB), 23 Days*

*Test Duration

DATE	DAY	REPLICATE 1				REPLICATE 2				REPLICATE 3				REPLICATE 4				REPLICATE 5			
		NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD
10/30/2000	0	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00
11/1/2000	2	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00
11/2/2000	3	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00
11/3/2000	4	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00
11/6/2000	7	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00
11/7/2000	8	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00
11/13/2000	14	1	1	9	10.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00
11/14/2000	15	0	1	9	10.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00
11/15/2000	16	0	1	9	10.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00
11/16/2000	17	0	1	9	10.00	0	0	10	0.00	4	4	6	40.00	9	9	1	90.00	0	0	10	0.00
11/17/2000	18	0	1	9	10.00	0	0	10	0.00	0	4	6	40.00	1	10	0	100.00	0	0	10	0.00
11/20/2000	21	0	1	9	10.00	0	0	10	0.00	5	9	1	90.00	0	10	0	100.00	0	0	10	0.00
11/21/2000	22	0	1	9	10.00	0	0	10	0.00	0	9	1	90.00	0	10	0	100.00	0	0	10	0.00
11/22/2000	23	0	1	9	10.00	0	0	10	0.00	0	9	1	90.00	0	10	0	100.00	0	0	10	0.00

DATE	DAY	REPLICATE 6				REPLICATE 7				REPLICATE 8				CUMULATIVE MORTALITY STATISTICS			
		NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	NO. DEAD	CUMUL. DEAD	CUMUL. LIVE	% DEAD	MEAN %	VAR (S2)	SEM	CV (%)
10/30/2000	0	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0.00	0.00	0.00	na
11/1/2000	2	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0.00	0.00	0.00	na
11/2/2000	3	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0.00	0.00	0.00	na
11/3/2000	4	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0.00	0.00	0.00	na
11/6/2000	7	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0.00	0.00	0.00	na
11/7/2000	8	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	0.00	0.00	0.00	na
11/13/2000	14	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	1.25	12.50	1.25	282.84
11/14/2000	15	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	1.25	12.50	1.25	282.84
11/15/2000	16	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	1.25	12.50	1.25	282.84
11/16/2000	17	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	17.50	1050.00	11.46	185.16
11/17/2000	18	0	0	10	0.00	0	0	10	0.00	0	0	10	0.00	18.75	1269.64	12.60	190.04
11/20/2000	21	0	0	10	0.00	1	1	9	10.00	0	0	10	0.00	26.25	1826.79	15.11	162.82
11/21/2000	22	0	0	10	0.00	0	1	9	10.00	0	0	10	0.00	26.25	1826.79	15.11	162.82
11/22/2000	23	0	0	10	0.00	0	1	9	10.00	0	0	10	0.00	26.25	1826.79	15.11	162.82

**HOUSATONIC RIVER PROJECT
SPIKE *RANA pipiens* DEVELOPMENTAL STUDY 2000
MALFORMATION DATA**

10/30/2000-11/22/2000

R4 Ref Larvae in Ref Site MP Spiked with 30.0 mg/Kg Aroclor 1260

REPLICATE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)					
					TAIL	FACE	EYE	BRAIN	HEMORRHAGE	BLISTER
1	10	9	2	20.00	2	2	2	1		1
2	10	5	2	20.00	1	2		2		1
3	10	9	2	20.00		2		2		2
4	10	0	na	na						
5	10	9	3	30.00	2	1		3	1	1
6	10	9	3	30.00	3	3		2	1	1
7	10	9	4	40.00	2	2		4	2	3
8	10	7	1	10.00	1	1			1	1
Total:	80	57	17		11	13	2	14	5	10
Means (based on initial larval count):				24.29	15.71	18.57	2.86	20.00	7.14	14.29
SEM:				3.45	0.27	0.24	na	0.37	0.18	0.28

10/30/2000-11/22/2000

R4 Ref Larvae in Ref Site MP Unspiked (0.04 mg/Kg Sed PCB)

REPLICATE ID	INITIAL No. LARVAE at DAY 0	No. of LARVAE LIVING	NUMBER MALFORMED	% MAL.	TYPE OF MALFORMATION (DELTS OBSERVED)					
					TAIL	FACE	EYE	BRAIN	HEMORRHAGE	BLISTER
1	10	9	0	0.00						
2	10	10	0	0.00						
3	10	1	0	0.00						
4	10	0	na	na						
5	10	10	0	0.00						
6	10	10	0	0.00						
7	10	9	0	0.00						
8	10	10	0	0.00						
Total:	80	59	0		0	0	0	0	0	0
Means (based on initial larval count):				0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM:				0.00	na	na	na	na	na	na

Appendix E

Amphibian Spiked Study - Survival on Day 2:

Start Date:	Test ID:	Sample ID:	Crossover
End Date:	Lab ID:	Sample Type:	PCB sediments
Sample Date:	Protocol:	Test Species:	<i>Rana Pipiens</i>
Comments: Leopard frog - Spiked Study			

Conc-mg/Kg	1	2	3	4	5	6	7	8
unspiked	0.9000	1.0000	0.1000	0.0000	1.0000	1.0000	0.9000	1.0000
spiked	0.9000	0.5000	0.9000	0.0000	0.9000	0.9000	0.9000	0.7000

Conc-mg/Kg	Mean	SD	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%	N		
unspiked	0.7375	0.4274	1.0783	0.1588	1.4120	48.589	8		
spiked	0.7125	0.3227	1.0226	0.1588	1.2490	38.052	8	55.50	51.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.714335	0.844	-1.42026	0.49517
F-Test indicates equal variances (p = 0.45)	1.813182	8.885308		
Hypothesis Test (1-tail, 0.05)				
Wilcoxon Two-Sample Test indicates no significant differences				

Appendix E

Amphibian Spiked Study - # Normal on Day 23

Start Date:	Test ID:	Sample ID:	Crossover
End Date:	Lab ID:	Sample Type:	PCB sediments
Sample Date:	Protocol:	Test Species:	<i>Rana Pipiens</i>
Comments: Leopard frog - Spiked Study; malformations do not include dead			

Conc-mg/Kg	1	2	3	4	5	6	7	8
unspiked	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
spiked	1.0000	0.8000	0.8000	0.8000	0.7000	0.7000	0.6000	0.9000

Conc-mg/Kg	Mean	SD	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%	N		
unspiked	1.0000	0.0000	1.4120	1.4120	1.4120	0.000	7		
*spiked	0.7875	0.1246	1.1064	0.8861	1.4120	14.846	8	39.50	49.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.78613	0.835	0.931763	3.386628
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)				
Wilcoxon Two-Sample Test indicates significant differences				

Since there are no malformations observed in the unspiked group, unless there are no malformation in the spiked group, a statistical difference will be found; assess if the difference in median responses are biologically significant

Appendix F

Photo Atlas

**HOUSATONIC RIVER PROJECT
RANA *pipiens* STUDY 2000 PHOTO ATLAS
TABLE OF FIGURES**

- Figure 1.** Male *Rana pipiens* adult from Site 34 (W-7a).
- Figure 2.** Female *R. pipiens* adult from Site 34 (W-7a).
- Figure 3.** Young female *R. pipiens* from Site 39 (W-1). Reproductively mature and “slightly gravid”.
- Figure 4.** Necropsy of healthy female from Site 36 (W-4). Note normalcy of stomach, liver, and intestine. Ovaries were removed and appear in Figure 5.
- Figure 5.** Mature ovary with normal distribution of maturing oocytes from Site 36 (W-4).
- Figure 6.** Immature ovary from Site 34 (W-7a).
- Figure 7.** Mature testes from male specimen collected from Site 39 (W-1).
- Figure 8.** Abnormal testes from male specimen collected from Site 34 (W-7a).
- Figure 9.** Reference larvae (R3) demonstrating normal development in Site 40 (MP) water.
- Figure 10.** Reference larvae (R3) in Site 33 (W-8) water demonstrating kinked tails.
- Figure 11.** Normal metamorphs cultured from artificially fertilized egg masses (Reference R3) in Reference Site 40 (MP) water.
- Figure 12.** Healthy gut from *R. pipiens* specimen from Site 33 (W-8).
- Figure 13.** Distended, unhealthy gut from Site 33 (W-8) specimen.
- Figure 14.** Stomach tumors found in *R. pipiens* specimen from Site 35 (W-6).
- Figure 15.** Healthy liver from *R. pipiens* specimen collected from Site 39 (W-1).
- Figure 16.** Mottled abnormal liver from specimen collected at Site 32 (W-9a).

Figure 1. Site 34 (W-7a)

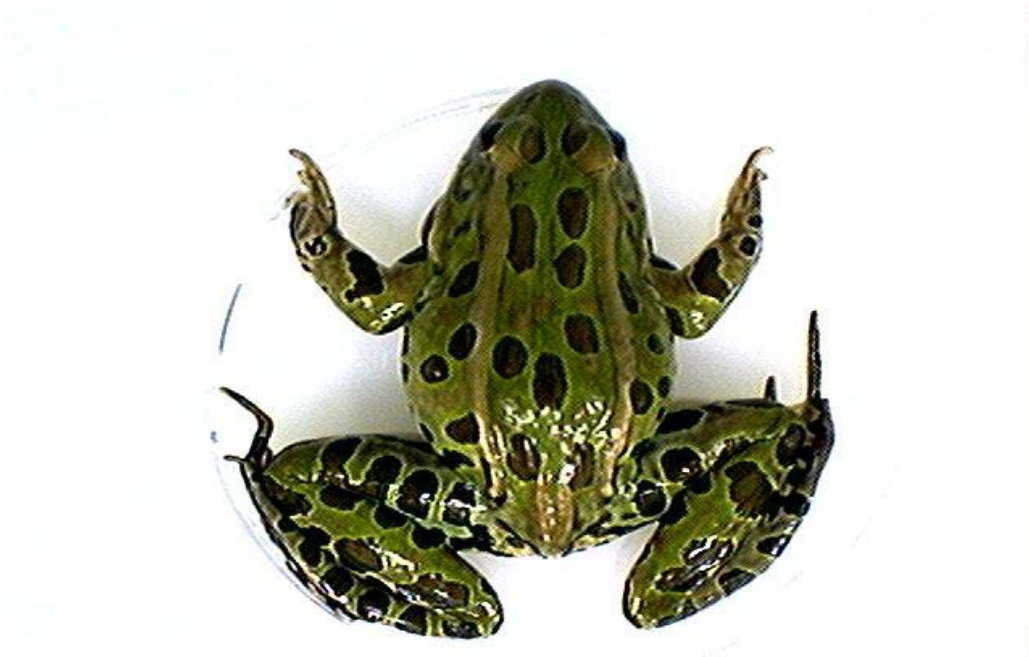


Figure 2. Site 34 (W-7a)



Figure 3. Site 39 (W-1)



Figure 4. Site 36 (W-4)

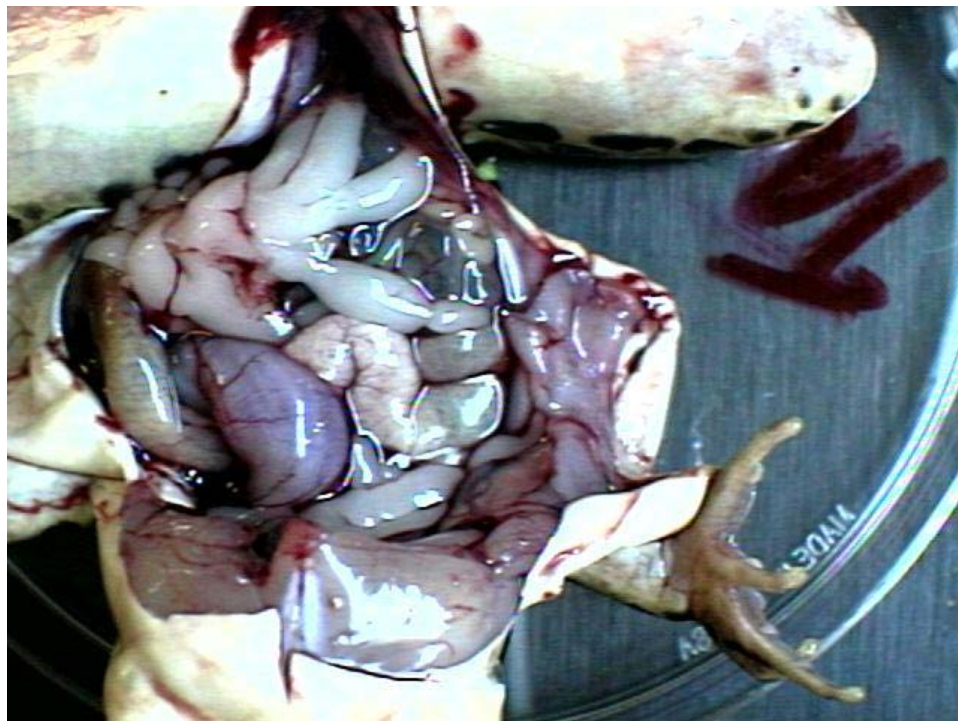


Figure 5. Site 36 (W-4)



Figure 6. Site 34 (W-7a)



Figure 7. Site 39 (W-1)



Figure 8. Site 34 (W-7a)



Figure 9. Reference Larvae R3 in Site 40 (MP)



Figure 10. Reference Larvae R3 in Site 33 (W-8)



Figure 11. R3 Specimen Cultured in Site 40 (MP)



Figure 12. Site 33 (W-8)

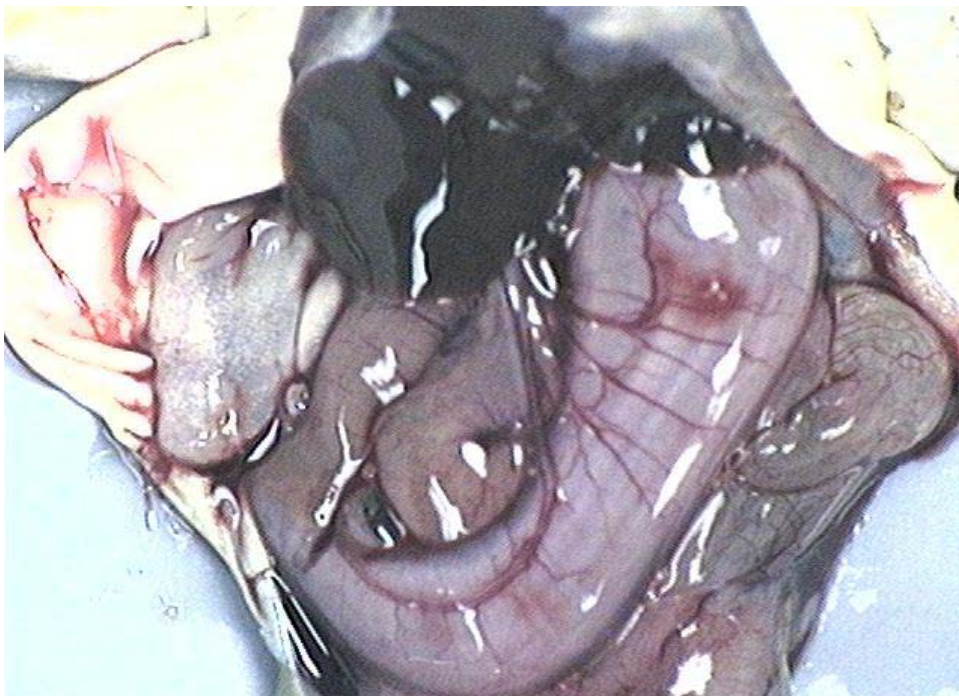


Figure 13. Site 33 (W-8)



Figure 14. Site 35 (W-6)



Figure 15. Site 39 (W-1)

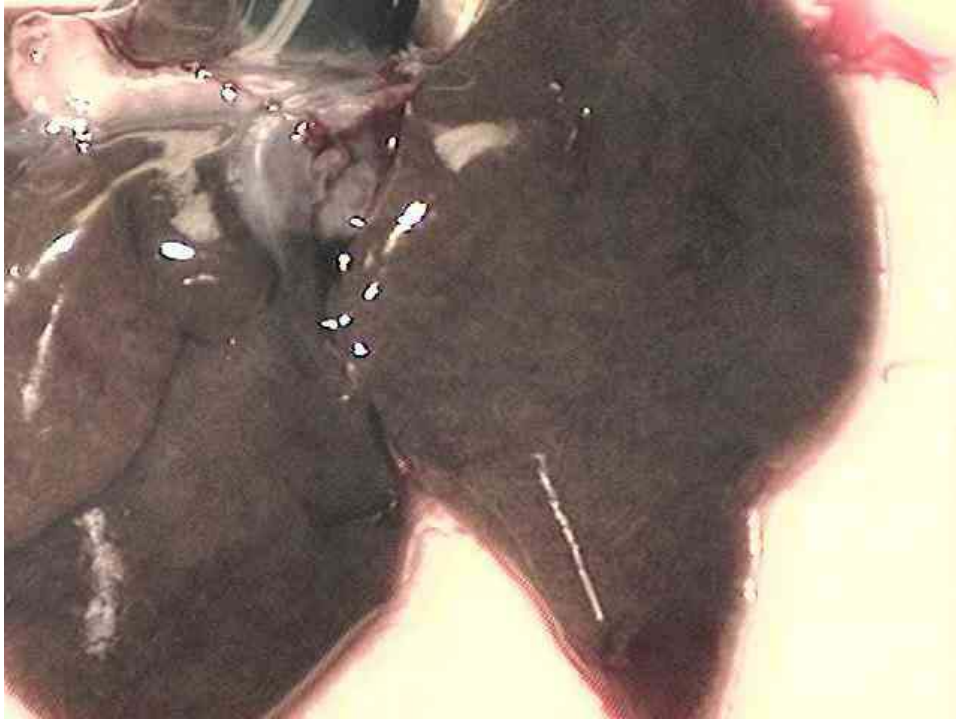


Figure 16. Site 32 (W-9a)

